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National
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GOSIP

Government Open Systems Interconnection Profile

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J. P. Favreau

NIST HANDBOOK 150-12

U.S. Department of Commerce
Technology Administration
National Institute of Standards
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[1] At Boulder, CO 80303.
[2] Some elements at Boulder, CO 80303.

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July 1995

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PREFACE

NIST Handbook 150-12 presents the technical requirements of the National Voluntary Laboratory Accreditation Program (NVLAP) for Federal Information Processing Standard (FIPS) 146-1 *Government Open Systems Interconnection Profile* (GOSIP) conformance testing series. It is intended for information and use by the staff of accredited laboratories and laboratories seeking accreditation, other laboratory accreditation systems, users of laboratory services, and organizations needing information on accreditation requirements.

This handbook supplements NIST Handbook 150, *NVLAP Procedures and General Requirements*, which contains Part 285 of Title 15 of the U.S. Code of Federal Regulations (CFR) plus all general NVLAP procedures, criteria, and policies. The criteria in NIST Handbook 150 encompass the requirements of ISO/IEC Guide 25 and the relevant requirements of ISO 9002 (ANSI/ASQC Q92-1987). Handbook 150-12 contains information that is specific to the NVLAP GOSIP Testing Program and interprets the Procedures and General Requirements, where appropriate.

The numbering of the sections of this handbook is patterned after Handbook 150; for example, Section 285.3 of Handbook 150 presents the description and goal of NVLAP, whereas Section 285.3 of this handbook presents a description of the GOSIP program. Where there is no information specific to GOSIP testing, the section number is omitted.

Questions or comments concerning this handbook should be submitted to the National Institute of Standards and Technology/NVLAP, Building 411, Room A162, Gaithersburg, MD 20899; phone (301) 975-4016; fax (301) 926-2884; e-mail NVLAP@enh.nist.gov.

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NVLAP program handbooks, published since 1982, comprise the combined efforts of the entire NVLAP staff, both past and present.

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SUMMARY

The National Institute of Standards and Technology (NIST), Computer Systems Laboratory (CSL) administers the U.S. GOSIP Testing Program that places products that meet program criteria, when tested in laboratories accredited by NVLAP, on the U.S. GOSIP Register. Additional information about the U.S. GOSIP Testing Program is available from NIST CSL (see Appendix D).

Establishment of the NVLAP GOSIP program (GOSIP LAP) was requested in 1989 by the NIST CSL, formerly the National Computer Systems Laboratory (NCSL), to accredit laboratories that conformance test GOSIP products for purchase by the U.S. Government.

Any laboratory (including commercial, manufacturers', university, federal, state, or local government) that uses test methods listed in this document may apply for NVLAP accreditation. Accreditation will be granted to a laboratory that complies with the conditions for accreditation as defined in this document. Accreditation does not mean a guarantee of laboratory performance or of product test data—it is a finding of laboratory competence.

Testing services covered: Conformance testing of Federal Information Processing Standards (FIPS) 146-1 *Government Open Systems Interconnection Profile* (GOSIP) series.

Period of accreditation: One year, renewable annually.

On-site assessment: Visit by a technical expert to determine compliance with the NVLAP criteria before initial accreditation and every two years thereafter. Monitoring visits as required. Initial assessment requires a demonstration of testing and procedure. Test demonstration can be at the laboratory site, a client site, a different laboratory designated site, or at a site designated by NIST.

Assessors: Selected from technical experts with experience in the appropriate field(s) of testing.

Proficiency testing: Each laboratory is required to demonstrate its capability to successfully perform conformance testing using Means of Testing (MOTs) listed in the U.S. GOSIP Testing Program MOT Register. Proficiency testing is required for initial accreditation and may be conducted annually thereafter. Advance notice and instructions are given before testing is scheduled.

Granting accreditation: Based upon satisfactory on-site assessment and resolution of deficiencies, proficiency testing, and technical evaluation of applicable laboratory information.

Fees: Payments are required as listed on the NVLAP fee schedule, including the administrative/technical support fee, on-site assessment fee, and test method fee.

Sec. 285.1 Purpose

The purpose of this handbook is to set out procedures and technical requirements for NVLAP accreditation of laboratories that test products for conformance to criteria set by the U.S. GOSIP Testing Program. It complements and supplements the NVLAP procedures and general requirements found in NIST Handbook 150.

The interpretive comments and additional requirements contained in this handbook make the general NVLAP criteria specifically applicable to the GOSIP LAP. This handbook also identifies the requirements for proficiency testing using registered Means of Testing (MOT), the specific on-site assessment criteria, and the requirements for a quality system. The quality system requirements are designed to comply with the requirements of ISO/IEC Guide 25 and ISO 9002.

Sec. 285.2 Organization of procedures

(a) The numbering of the sections of this handbook is patterned after NIST Handbook 150, *NVLAP Procedures and General Requirements*, to allow easy cross-reference.

(b) The procedures and general requirements of handbook 150 and the interpretations and specific requirements in this handbook must be combined to produce the criteria for accreditation in the GOSIP LAP.

(c) This handbook contains appendices which supplement the text:

(1) Appendix A provides examples of a NVLAP Certificate of Accreditation and a Scope of Accreditation for the GOSIP LAP.

(2) Appendix B provides the General Operations Checklist, which NVLAP assessors use during an on-site technical assessment to evaluate a laboratory's ability to conduct testing in general.

(3) Appendix C provides the GOSIP Specific Operations Checklists, which are used by NVLAP assessors during on-site assessments of laboratories. These checklists may also be used by the laboratories to structure the conduct of internal technical audits.

(4) Appendix D describes the NIST CSL role in the establishment of Federal Information Processing Standards (FIPS) and product conformance testing programs.

(5) Appendix E presents the GOSIP program Test Method Selection List from the NVLAP application package.

(6) Appendix F presents a list of acronyms used in this handbook and their meanings.

Sec. 285.3 Description GOSIP LAP

The purpose of the GOSIP LAP is to accredit laboratories that perform conformance testing in support of the U.S. Government Open Systems Interconnection Profile (GOSIP) Testing Program which was defined to assist federal agencies in assuring conformance to the GOSIP FIPS.

The GOSIP LAP was initiated at the request of the NIST CSL to accredit laboratories that conformance test GOSIP products for purchase by the U.S. Government.

The role of NIST CSL in the establishment of FIPS and product conformance testing programs is described in Appendix D.

NISTIR 5438, *Industry Government Open Systems Specification Testing Framework*, defines the framework for the establishment of registers, including Conformance-Tested GOSIP Products, NVLAP-Accredited Test Laboratories, and Assessed Means of Testing (MOT).

Laboratories must be aware of and have an understanding of all of the versions of GOSIP which have been issued, and that there will be future versions which provide for the specification and testing of other OSI protocols. A laboratory may be accredited for testing some GOSIP protocols and profiles even though it does not provide testing services for all applicable profiles. The laboratory must make these limitations clear to its customers and in its test reports. A laboratory with limited GOSIP profile testing capability using specified MOTs may subsequently increase its capability to cover additional GOSIP profiles and MOTs. For any increase in capability to be covered under the accreditation, all NVLAP criteria must be met for the additional GOSIP profiles.

The accreditation of GOSIP MOTs per se is outside the scope of this NVLAP program. However, a separate CSL program exists for the assessment and registration of MOTs. For NVLAP criteria to be satisfied, MOTs must be selected from this register.

Sec. 285.4 References

Reference documents, standards and publications for the GOSIP program and their sources are given below.

(a) NVLAP publications

(1) NIST Handbook 150, *NVLAP Procedures and General Requirements*; and

(2) NIST Special Publication 810, 1995 edition, *NVLAP 1995 Directory*.

NVLAP publications may be ordered from:

NIST/NVLAP
Building 411, Room A162
Gaithersburg, MD 20899

Phone: (301) 975-4016
Fax: (301) 926-2884
E-mail: NVLAP@enh.nist.gov

(b) NIST CSL publications

(1) NISTIR 5438, *Industry Government Open Systems Specification Testing Framework*; and

(2) NIST CSL *Means of Testing Assessment handbook for GOSIP Conformance Testing*.

NIST CSL publications may be ordered from:

NIST CSL
Building 225, Room B64
Gaithersburg, MD 20899

Phone: (301) 975-2816
Fax: (301) 948-1784.

Laboratories should contact NIST CSL for copies of other documents required for the GOSIP LAP listed in the Facilities and Records Checklist in Appendix C.

NIST CSL
Building 225, Room B217
Gaithersburg, MD 20899

Phone: (301) 975-3634
Fax: (301) 590-0932
E-mail: night@snad.ncsl.nist.gov

or

GOSIP Testing Program
Joint Interoperability Test Center
Fort Huachuca, AZ 85613-7020

E-mail: gosip@huachuca-jitcosi.army.mil

(c) National Technical Information Service (NTIS) publications

(1) Federal Information Processing Standards Publication 146 (FIPS PUB 146), Government Open Systems Interconnection Profile (GOSIP); and

(2) Validated Products List - a NISTIR update quarterly. Ordering number PB93-937303/AS.

NTIS publications may be ordered from:

National Technical Information Service
5285 Port Royal Road
Springfield, VA 22161

Phone: (703) 487-4650
Fax: (703) 321-8547.

(d) American National Standards Institute (ANSI) publications

(1) ISO/IEC 9646, *OSI Conformance Testing Methodology and Framework*; and

(2) ISO documents listed in the Facilities and Records Checklist (Appendix C).

ANSI publications may be ordered from:

American National Standards Institute
11 West 42nd Street, 13th Floor
New York, NY 10036

Phone: (212) 642-4900
Fax: (212) 302-1286.

Sec. 285.5 Definitions

See Appendix F for a list of acronyms and their meanings.

Abstract Test Case: A complete and independent specification of the actions required to achieve a specific test purpose (or a specified combination of test purposes), defined at the level of abstraction of a particular abstract test method. It may include a preamble and postamble to ensure starting and ending in a stable state (i.e., an identifiable stable state of the SUT which can be easily reached and maintained, such as the "idle" state or the "data transfer" state). This specification may involve one or more consecutive or concurrent connections.

Abstract Test Method: The description of how an IUT is to be tested, given at an appropriate level of abstraction to make the description independent of any particular implementation of testing tools, but with enough detail to enable tests to be specified for this test method.

Acceptance Testing: Formal testing conducted to determine whether or not a system satisfies its acceptance criteria and to enable the customer to determine whether to accept the system. Formal testing may include the planning and execution of several kinds of tests (e.g., functional, volume, performance tests) to demonstrate that the implementation satisfies the customer requirements.

Basic Interconnection Tests: Limited tests of an IUT to determine whether or not there is sufficient conformance to the relevant protocol(s) for interconnection to be possible, without trying to perform thorough testing.

Behavior Tests: Tests to determine the extent to which the dynamic conformance requirements are met by the IUT.

Capability Tests: Tests to determine the capabilities of an IUT. (Note: this involves checking all mandatory capabilities and those optional ones that are stated in the Protocol Implementation Conformance Statement (PICS) as supported, but not checking those optional ones which are stated in the PICS as not supported by the IUT.)

Certificate of Conformance Testing: A certificate authorized by authority of the Director of CSL which formally acknowledges that conformance testing was conducted to assess compliance of a product to GOSIP by an accredited test laboratory using a registered test method; compliance is demonstrated by both a System Conformance Test Report and Protocol Conformance Test Report(s) indicating that no tests selected and executed demonstrate instances of nonconformance.

Conformance: In the context of OSI, a real system is said to exhibit conformance if it complies with the requirements of applicable OSI standards in its communication with other real systems.

Conformance Testing: Testing the extent to which an IUT is a conforming implementation.

Coordinated Test Method: An external test method for which a standardized test management protocol is defined as the test coordination procedures, enabling the control and observation to be specified solely in terms of the lower tester activity, including the control and observation of test management PDUs.

Distributed Test Method: An external test method in which there is a PCO at the layer boundary at the top of the IUT.

Dynamic Conformance Requirements: All those requirements and options which determine what observable behavior is permitted by the relevant OSI standards in instances of communication.

Dynamic Interoperability Requirements: All those requirements and options which determine what observable behavior is permitted between peer open systems by compatible standardized profiles of OSI standards, in instances of communication.

Embedded Testing: Testing the behavior of a single layer within a multi-layer IUT without accessing the layer boundaries for that layer within the IUT. (This is contrasted with "exposed" testing in which the N-service PCO of the IUT is accessible for testing.)

Equivalent Configuration: Any configuration for which conformance is achievable using the same registered test method version used in conformance testing of an implementation under test.

GOSIP Product: A product which implements one or more of the data communications protocols identified in GOSIP and meets the requirements specified herein.

Implementation Under Test (IUT): An implementation of one or more OSI protocols in an adjacent user/provider relationship, being that part of a real open system which is to be studied by testing.

Interconnection: Establishment of communication between peer protocol entities over a physical medium or an OSI layer service.

Interoperability Test: An informal test script specified in terms of abstract services, which includes protocol exchange requirements, designed to achieve a specified test purpose.

Interoperability Testing: Testing pairs of compatible, conforming, open systems to demonstrate provision of the application service by each peer.

Means of Testing: The realization of an abstract test method as defined in the OSI Conformance Testing Methodology and Framework. This realization includes the test system, executable test suite, testing support tools (hardware and software) and documentation (including technical test procedures).

Multi-Layer Testing: Testing the behavior of a multi-layer IUT as a whole, rather than testing it layer by layer (in contrast to Single-Layer Testing).

Out-of-Band Coordination: A separate communications path used for test coordination procedures which may be realized from a lower-layer service or alternative physical media.

Product Interoperability Test Report: A document written at the end of the interoperability testing process, giving the details of the testing carried out for a specific interoperability test suite.

Protocol Conformance Test Report (PCTR): A document written at the end of the conformance assessment process, giving the details of the testing carried out for a particular protocol. It includes the identification of the abstract test cases (if these exist) for which corresponding executable test cases were run. It also includes the test purpose(s) and verdict for each test case.

Protocol Implementation Conformance Statement (PICS): A statement made by the supplier of an OSI implementation, or system, stating which capabilities and options have been implemented, for a given OSI protocol.

Protocol Implementation eXtra Information for Testing (PIXIT): A statement made by a supplier or implementor of an IUT which contains or references all of the information (in addition to that given in the PICS) related to the IUT and its testing environment, which will enable the test laboratory to run an appropriate test suite against the IUT.

Remote Test Method: An external test method in which there is neither a PCO above the IUT nor a standardized test management protocol. Some requirements for test coordination procedures may be implied or informally expressed in the abstract test suite, but no assumption is made regarding their feasibility or realization.

Single-Layer Testing: Testing the behavior of one-layer protocol from a multi-layer IUT.

Static Conformance Requirements: Constraints which are specified in OSI standards to facilitate interworking by defining the requirements for the capabilities of an implementation.

Static Interoperability Requirements: For potentially interoperable peers these include:

- Compatible static conformance requirements;
- Both systems successfully conformance tested;
- Peers are configured to enable interconnection.

System Conformance Test Report (SCTR): A document written at the end of the conformance assessment process, giving the overall summary of the conformance of the system to the set of protocols for which conformance testing was carried out.

System Under Test (SUT): The real open system in which the IUT resides.

Test System Environment Specification: A statement made by a supplier or an implementor of an OSI product which contains or references all of the information (in addition to that given in the PICS) related to the implementation and its environment, which will enable the test parties to execute an appropriate test suite against their implementations.

Verdict: A statement of "Pass," "Fail," or "Inconclusive," specified in the abstract test suite concerning conformance of an IUT with respect to a test case that has been executed.

Sec. 285.6 NVLAP documentation

(a) Handbooks

(1) The NVLAP procedures and general requirements are contained in NIST Handbook 150. NIST Handbook 150 is used for all

NVLAP testing laboratory and calibration laboratory programs. The portions of NIST Handbook 150 marked with a triangle in the margin do not apply to GOSIP laboratories; they concern calibration laboratories.

The general terms used in NIST Handbook 150 are interpreted, expanded, and detailed in the program-specific handbook.

(2) The technical procedures and program-specific requirements are contained in this handbook.

(b) Checklists

(1) Checklists contain definitive statements or questions about all aspects of the NVLAP criteria for accreditation. Checklists are filled out during the on-site assessment, discussed during the exit briefing, signed by the laboratory representative and the assessor, and a copy is given to the laboratory. The checklists become part of the laboratory history kept by NVLAP.

(2) NVLAP programs incorporate two types of checklists:

(i) The NVLAP General Operations Checklist addresses factors applicable to evaluating a laboratory's ability to conduct testing in accordance with the procedures and general requirements for accreditation. The factors include, but are not limited to, the laboratory's organization, management, and quality system in addition to its testing competency.

The General Operations Checklist, presented in Appendix B, is numbered to correspond to the requirements in NIST Handbook 150.

(ii) The Specific Operations Checklist, presented in Appendix C, is specific to U.S. GOSIP conformance testing, focuses on the testing requirements, and includes the assessor's observations of test demonstrations. This checklist may be revised when appropriate to reflect changes in the technical requirements, scope, and/or technology of the program.

(3) Each of the two checklists ends with a comments and deficiencies sheet. The assessor uses these sheets to explicitly identify and describe deficiencies noted in the body of the checklists. Additionally, the assessor may use the sheets to document comments on any aspect of the laboratory or its performance.

Sec. 285.22 Assessing and evaluating a laboratory

(a) On-Site Assessment

(1) The on-site assessment for GOSIP laboratories will most likely be performed by one or two NVLAP assessors in one day plus the following morning. Laboratories being assessed for a larger scope of accreditation may take two assessors two days. All observations made by the assessors during the assessment are held in strictest confidence.

The on-site assessment may involve the laboratory site and a separate test site for the proficiency testing. If the site for the proficiency demonstration is geographically remote from the laboratory site, the demonstration will have to occur before the laboratory visitation. The laboratory should provide or arrange for transportation to any remote sites for the assessor and laboratory personnel.

The assessor will use the General Operations Checklist and the GOSIP Specific Operations checklists. The checklists serve to ensure a complete assessment and that all assessors cover the same items at each laboratory. The checklists contain questions to cover all possible assessment issues, both general and specific; however, not all questions will apply in all circumstances. On the other hand, the assessor may go beyond the checklists in order to delve more deeply into a technical issue.

The assessor will need to take breaks during the visit to fill in the NVLAP checklists and to prepare the On-Site Assessment Report.

The laboratory will be responsible for demonstrating its general knowledge of the U.S. GOSIP Testing Program, the MOT(s) used by the laboratory, the conduct of testing, analysis of testing results, and preparation of test reports.

(2) The agenda for a typical on-site visit is given below.

(i) The assessor(s) meets with laboratory management, supervisory personnel, and selected staff to explain the purpose of the on-site assessment and to discuss the schedule for the assessment activities. Information provided by the laboratory on its NVLAP application form may be discussed during this meeting.

The laboratory manager decides which staff members attend the meeting.

The assessor will ask the laboratory manager to assist in arranging times for interviews with laboratory staff members. While it is not necessary for the assessor to talk to all of the staff members, he/she may select staff members representing all aspects of the laboratory.

Laboratory personnel should not answer questions they feel unqualified to answer. Knowing whom to ask or where to find the answer is usually considered an acceptable response by the assessor.

(ii) The assessor reviews laboratory documentation, including the quality system documents, quality manual, equipment records, software versions, testing procedures, test reports, personnel competency records, and personnel training plans and records.

The assessor will have reviewed the quality manual submitted to NVLAP before the on-site assessment. The assessor will discuss the manual with the designated laboratory staff and return the manual to the laboratory.

Although there must be a laboratory staff member available to answer questions, the assessor may wish to review the documents alone. The assessor does not usually ask to remove any documents from the laboratory.

The assessor will check personnel information for job descriptions, résumés, and technical performance reviews. The assessor need not be given information which violates individual privacy such as salary, medical information, or performance reviews outside the scope of the laboratory's accreditation. At the discretion of the laboratory, a member of its human resources department may be present during the review of personnel information.

(iii) The assessor examines hardware and software facilities for appropriateness, capability, adherence to specification, etc. at the laboratory site and, if appropriate, at the test site.

Laboratory staff members should be available to demonstrate hardware and software and to answer questions.

(iv) The assessor will conduct proficiency testing with the laboratory using its registered MOTs. This will be at the laboratory or another mutually agreeable site. The software and system under test during proficiency testing need not be U.S. GOSIP conformant.

The MOT should be ready to use when the NVLAP assessor arrives at the test demonstration site. During the demonstration the assessor may ask that selected files be reloaded, configuration be explained, and selected tests be run. The assessor may bring prepared test reports and ask that results be interpreted by the laboratory. A complete test report produced by the laboratory should be available for discussion.

(v) At the end of the on-site assessment, an exit briefing is held with the laboratory manager and staff to discuss the assessor's findings.

Comments not identified as deficiencies by the assessors should be given serious consideration, but are taken at the laboratory's discretion. Any disagreements between the laboratory and the assessor should be referred to NVLAP for further evaluation.

At the conclusion of the exit briefing, the laboratory Authorized Representative and the assessor both sign the On-Site

Assessment Report and the checklists. A copy of the report and of the two checklists is given to the Authorized Representative.

(b) Proficiency Testing

(1) Proficiency testing is an integral part of the NVLAP accreditation process. Applicant laboratories will be required to participate satisfactorily in proficiency testing prior to initial accreditation. Laboratories renewing accreditation must have satisfactorily participated in all required proficiency testing during their previous accreditation period.

(2) To evaluate the effective and proper operation of a laboratory, proficiency testing may consist of several parts. The proficiency testing concept is designed to allow the evaluation of the laboratory's ability to produce repeatable and reproducible test data. Portions of the testing process may be "highlighted" in proficiency testing; e.g., software, hardware, data analysis, etc. Proficiency testing may embody the following:

(i) demonstration of the ability to load and configure the appropriate MOTs;

(ii) demonstration of the ability to interpret test results;

(iii) demonstration of proficiency with the test suite during an on-site visit; and

(iv) submission of test reports to the registrar of the U.S. GOSIP Testing Program.

(3) The results of proficiency testing will be made available to on-site assessors for use during laboratory assessment visits. Problems indicated by proficiency testing will be discussed with appropriate laboratory personnel, who will then be responsible for developing and implementing plans for resolving the problems. Deficiencies identified by proficiency testing during an on-site assessment or submission of a certification report must be resolved in a manner similar to the process for on-site deficiency resolution.

Sec. 285.33 Criteria for accreditation

(a) Scope

(1) This section sets out the specific requirements in accordance with which a laboratory has to demonstrate that it operates, if it is to be recognized as competent to carry out GOSIP conformance testing.

(2) References in NIST Handbook 150 to statistics, physical testing, calibration, test instruments, and interlaboratory comparisons do not generally apply to GOSIP conformance testing in the traditional sense.

(b) Organization and management

A laboratory may conduct "first party" testing (testing for clients within its own company), "third party" testing (as an independent laboratory), or both, as long as appropriate policies, procedures, and confidentiality requirements are met.

(c) Quality system, audit and review

(1) The quality system requirements are designed to promote laboratory practices which ensure technical integrity of testing and analyses and adherence to quality practices appropriate to GOSIP conformance testing. The laboratory must maintain a quality manual which documents the laboratory procedures and practices and the specific steps taken to ensure the quality of GOSIP conformance testing.

The quality manual must contain or refer to documentation which describes and details the laboratory's implementation of procedures covering all of the technical requirements in this handbook. This information will be reviewed by NVLAP assessors during on-site assessments.

(2) The quality manual must include procedures for software handling and integrity, procedures for conduct of testing at client sites, and procedures for converting from one storage media to another.

Specific procedures must be documented for long-distance testing over Wide Area Networks where the SUT is not directly under the control of the testing laboratory.

There must be procedures and documentation for all computer equipment and communications connectivity in use.

The quality system must provide for routine checks of the competence of the staff involved in the conduct and evaluation of tests. The quality manual must contain a detailed test plan for the conduct of U.S. GOSIP conformance testing and describe how the laboratory assures the accuracy and consistency of its results. Records must be kept of all quality system activities.

Reference documents, standards, and publications for the U.S. GOSIP Testing Program listed in Sec. 285.4 and Appendix C of this handbook shall be available in the laboratory for reference in developing and maintaining the quality system.

The laboratory should establish and maintain documented procedures for the review of contracts between itself and its clients. The contract review should be conducted to assure that the laboratory is capable of providing the service and that the requirements, rights, and responsibilities of the parties are understood.

(3) Audits and review must be conducted on a periodic basis.

(i) In the case where only one member of a laboratory staff is competent to conduct specific aspects of the conformance testing program, audits must at least include documentation and instructions, adherence to procedures and instructions, and documentation of the audit findings.

(ii) In order to audit technical aspects of the program, external audits by NVLAP or another appropriate organization, submission of certification test reports to NIST, and/or telephone audits by Technical Experts may be necessary.

(d) Personnel

(1) The laboratory shall maintain a competent administrative and technical staff appropriate for U.S. GOSIP conformance testing. The laboratory shall maintain position descriptions and résumés for the staff members assigned to GOSIP testing related positions and responsible supervisory personnel.

The laboratory shall maintain a list of personnel designated to fulfill NVLAP requirements including; laboratory director, Authorized Representative, Approved Signatories, and key technical persons in the laboratory. The laboratory must assign a staff member who has overall responsibility for the quality system and the quality manual.

(2) Laboratories shall document the required qualifications of each staff position involved in the U.S. GOSIP conformance testing process. The staff information may be kept in the laboratory's official personnel folders or in separate, official folders that contain only the information that the NVLAP assessor(s) needs to review.

(3) The laboratory shall have staff members with appropriate college degrees or working experience who are knowledgeable in OSI, conformance testing, appropriate operating systems, and the U.S. GOSIP requirements. This experience and expertise shall be documented.

(4) The laboratory shall have a detailed documented description of its training program for new and current staff members. Each new staff member must be trained for assigned duties. Current staff members must be retrained when hardware and/or software are changed or they are assigned new responsibilities. Each staff member may receive training for assigned duties either through on-the-job training, formal classroom study or other appropriate mechanism.

(5) The laboratory shall evaluate the competency of each staff member for each test method the staff member is authorized to conduct. An evaluation and an observation of performance must be conducted annually for each staff member by the immediate supervisor or a designee appointed by the laboratory director. A record of the annual evaluation of each staff member must be dated and signed by the supervisor and the employee.

A description of competency review programs shall be maintained in the quality manual.

(e) **Accommodation and environment**

(1) The laboratory shall have adequate facilities to meet the requirements for NVLAP accreditation. This includes facilities for conformance testing, staff training, record-keeping, document storage, and software storage.

(2) While not required, e-mail capability is valuable. Documents related to the U.S. GOSIP Program, the U.S. GOSIP Registers, and the Validated Products List are available by e-mail.

(3) Communication with NIST and JITC officials may be conducted through e-mail.

NVLAP nvlap@enh.nist.gov
NIST/CSL night@snad.ncsl.nist.gov
JITC gosip@huachuca-jitcosi.army.mil

(f) **Equipment and reference materials**

(1) The laboratory must maintain on-site systems adequate to support each Means of Testing for which NVLAP accreditation is sought. The laboratory shall be capable of assuring that its test capability, including all hardware and software, is functioning properly. The laboratory shall establish and maintain communications connectivity including the following:

(i) 3-layer X.25 connectivity which is compatible with GOSIP, or

Local Area Network connectivity to support the Means of Testing for the accredited GOSIP profiles;

(ii) CSL Registered Means of Testing for each test method for which NVLAP accreditation is sought;

(iii) reference materials to enable communication with, and exercise of, each MOT; and

(iv) computer equipment with:

- sufficient power to communicate with any SUT in real-time, without undue processing delays;

- enough terminals and printers to support all scheduled clients for testing; and

- enough on-line backing store to hold log files for a complete run of tests for a GOSIP profile, for each client scheduled.

(2) For the GOSIP LAP, the reference to removal from service of defective equipment in NIST Handbook 150, Section 285.33(f)(2) shall only apply to MOTs or connectivity.

(g) **Measurement traceability and calibration**

(1) ***Measurement traceability and calibration requirements do not, in the traditional sense, apply to U.S. GOSIP Conformance Testing.*** They have been defined in terms of validation and traceability in ISO/IEC DTR 13233, *Draft Technical Report - Interpretation of Accreditation Requirements in ISO/IEC Guide 25 - for Information Technology and Telecommunications Testing Laboratories for Software and Protocol Testing Services.*

(2) The traceability of the test results are assured through the use of Registered ATS, MOTs, NVLAP-accredited laboratories, and Reference Entities for Means of Testing Assessments.

(3) The concept of MOT validation is used to meet the requirements for verification of equipment.

(h) **Calibration and test methods**

(1) For the purposes of testing GOSIP protocols, laboratories shall adopt only the test methods described in the appropriate FIPS. All Means of Testing in use shall be registered with CSL. For details, see the CSL Means of Testing Assessment handbook.

(2) The laboratory shall maintain procedures in its quality manual for installing and using the Means of Testing for each tested GOSIP profile. These procedures must include:

(i) hardware requirements and configuration;

(ii) software requirements and configuration;

(iii) installation of each Means of Testing on the system;

(iv) control of the environment (separation of data for multiple concurrent testing campaigns);

(v) procedures for static analysis;

(vi) operation of the Means of Testing including selection, execution and results analysis; and

(vii) procedures for test report production.

(3) Any errors or problems experienced with the Means of Testing should be reported to the MOT supplier and to:

U.S. GOSIP Testing Program
National Institute of Standards and Technology
Computer Systems Laboratory
Building 225, Room B217
Gaithersburg, MD 20899
E-mail: night@snad.ncsl.nist.gov

An MOT that has been modified must be validated and approved for placement on the Register before it can be put into use.

(4) If clients have questions on policy, interpretation of test results, or the FIPS, the laboratory should direct the client to submit written comments on issues in question to the U.S. GOSIP Testing Program.

(5) When an Implementation Under Test has successfully passed the test, copies of the official report shall be furnished to the client and, if requested by the client, to the U.S. GOSIP testing program for evaluation leading to addition to the register of conformance tested GOSIP products.

(6) Tests may be conducted at the client or laboratory site or other mutually agreed upon site. Written procedures must be maintained and followed for testing at sites outside of the laboratory.

(7) Copies of documents the laboratory uses to describe or elaborate on the meaning of the test procedures must be available to laboratory personnel when those documents apply to the testing being performed.

(j) Records

(1) The laboratory must maintain a functional record-keeping system for each client test. Records must be easily accessible and contain complete information on the subject. Magnetic storage media must be logged and properly marked.

(2) Records covering the following are required and will be reviewed by the assessor during the on-site visit either in total or by selective sampling:

(i) quality system;

(ii) staff training records and competency reviews;

(iii) testing equipment lists and maintenance records;

(iv) test facilities and plans;

(v) Means of Testing Registration Certificates;

(vi) test methods and procedures;

(vii) software version and updates; and

(viii) test data and reports, including PICS, PIXITs, PCTR and SCTR.

(k) Certificates and reports

(1) The laboratory shall issue test reports of its work which accurately, clearly, and unambiguously present the test conditions, test setup, test results, and all required information. Test reports to clients should meet contractual requirements. Test reports should provide all necessary information to permit the same or another laboratory to repeat the test and obtain comparable results.

There are two basic types of test reports:

- reports that are produced under contract and intended for use by the client; and

- reports to be submitted to the U.S. GOSIP Registration Program.

(2) Reports intended for use only by the client shall meet client/laboratory contract obligations and be complete, but need not necessarily meet all certification requirements. The test report or the test folder maintained by the laboratory must contain sufficient information for the exact test conditions to be repeated at a later time if a retest is necessary.

(3) Test reports created for submission to the registrar of the U.S. GOSIP Testing Program shall be issued in accordance with the type and formats required by ISO/IEC 9646-Part 5: *OSI Conformance Testing Methodology and Framework, Requirements on Test Laboratories and Clients for the Conformance Assessment Process*, and any requirements given in the GOSIP Product Registration handbook.

Test reports to be submitted to the U.S. GOSIP Testing Program, including the SCTR and all associated PCTRs, shall be for the purpose of registration in the list of conformance tested products. Each test report shall be signed by a NVLAP Approved Signatory.

APPENDIX A

SAMPLE ACCREDITATION DOCUMENTS

United States Department of Commerce
National Institute of Standards and Technology

NVLAP®

ISO/IEC GUIDE 25:1990
ISO/IEC GUIDE 58:1993
ISO 9002:1994

Certificate of Accreditation

DEPARTMENT OF COMMERCE ★ UNITED STATES OF AMERICA ★

LABORATORY, INC.
ANYTOWN, USA

is recognized under the National Voluntary Laboratory Accreditation Program for satisfactory compliance with criteria established in Title 15, Part 285 Code of Federal Regulations. These criteria encompass the requirements of ISO/IEC Guide 25 and the relevant requirements of ISO 9002 (ANSI/ASQC Q92-1987) as suppliers of calibration or test results. Accreditation is awarded for specific services, listed on the Scope of Accreditation for:

COMPUTER APPLICATIONS TESTING

January 1, 19xx
Effective until

For the National Institute of Standards and Technology

NVLAP LAB CODE: 0000

National Institute of Standards and Technology NVLAP® *National Voluntary Laboratory Accreditation Program*

ISO/IEC GUIDE 25:1990
ISO/IEC GUIDE 58:1993
ISO 9002:1994

Scope of Accreditation

COMPUTER APPLICATIONS TESTING **NVLAP LAB CODE 0000**

LABORATORY, INC.
1 Main Street
Anytown, USA 00000
John Doe Phone: 301-555-1212

NVLAP Code	*Designation*
	Government Open Systems Interconnection Profile (GOSIP) Conformance Testing using test methods in ISO/IEC 9646 OSI Conformance Testing Methodology and Framework.
17/G01	ISO/IEC 8571/8650/8823: FTAM/ACSE/Presentation (Session)
17/G03	ITU X.400-1984 MHS: P2/P1/RTS/(Session)
17/G05	ISO/IEC 8327: Session
17/G07	ISO/IEC 8073: Transport Class 4
17/G09	ISO/IEC 8073: Transport Class 2/Transport Class 0
17/G11	ISO/IEC 8473: Connectionless Network Protocol (CLNP)
	ISO/IEC 9542: End System-Intermediate System (ES-IS)
17/G13	ISO/IEC 8802.2/8802.3
17/G19	ITU X.25: PLP/HDLC LAP B
17/G21	ITU X.400-1988 MHS
	ITU X.400-1988 MHS: P2/P1/RTSE/ACSE/Presentation (Session)
	ITU X.400-1988 MHS: P3
	ITU X.400-1988 MHS: P3/ROSE
	ITU X.400-1988 MHS: P7
	ITU X.400-1988 MHS: P7/ROSE
17/G23	ITU-T X.500-1988 DS:Directory Services - Directory Access Protocol

January 1, 19xx
Effective until

For the National Institute of Standards and Technology

APPENDIX B

GENERAL OPERATIONS CHECKLIST

NVLAP LAB CODE: _____

GENERAL OPERATIONS CHECKLIST

Instructions to the Assessor: This checklist addresses general accreditation criteria prescribed in applicable sections of NIST Handbook 150, *NVLAP Procedures and General Requirements*.

This checklist follows and is numbered to correspond to the *NVLAP Procedures and General Requirements*, Subsection 285.33. The numbers in square brackets identify related checklist items. A small black triangle appears in the left-hand margin of selected lines of text throughout this checklist; the marked text applies only to the Calibration Laboratory Accreditation Program (LAP).

Place an "X" beside each checklist item which represents a deficiency. Place a "C" beside each item on which you are commenting for other reasons. Record the item number and your written deficiency explanations and/or comments in this list or on the attached comment sheets. Place a check beside all other items you observed or verified at the laboratory.

SEC. 285.33 CRITERIA FOR ACCREDITATION

(b) ***Organization and management***

(1) The laboratory shall be:

_____ (i) legally identifiable;

Legal name of laboratory ownership: _____

(ii) organized and shall operate in such a way that its permanent, temporary and mobile facilities meet the NVLAP requirements [see also (b)(2)(i), (c)(2)(ii)];

_____ (iii) properly identified on the NVLAP Application.

(2) The laboratory shall:

_____ (i) have managerial staff with the authority and resources needed to discharge their duties [see also (b)(1)(ii), (c)(2)(ii)];

_____ (ii) have policies to ensure that its personnel are free from any commercial, financial and other pressures which might adversely affect the quality of their work;

_____ (iii) be organized in such a way that confidence in its independence of judgment and integrity is maintained at all times;

_____ (iv) specify and document the responsibility, authority and interrelation of all personnel who manage, perform or verify work affecting the quality of calibrations and tests;

_____ (v) provide supervision by persons familiar with the calibration or test methods and procedures, the objective of the calibration or test, and the assessment of the results. The ratio of supervisory to non-supervisory personnel shall be such as to ensure adequate supervision;

_____ (vi) have a technical manager (however named) who has overall responsibility for the technical operations;

Name of person: _____

_____ (vii) have a quality manager (however named) who has responsibility for the quality system and its implementation. The quality manager shall have direct access to the highest level of management at which decisions are taken on laboratory policy or resources, and to the technical manager. In some laboratories, the quality manager may also be the technical manager or deputy technical manager;

Name of person: _____

_____ (viii) nominate deputy(ies) in case of absence of the technical or quality manager;

Name(s): _____

_____ (ix) have documented policy and procedures to ensure the protection of clients' confidential information and proprietary rights [see also (c)(2)(xviii)];

_____ (x) where appropriate, participate in interlaboratory comparisons and proficiency testing programs [see also (c)(2)(xiv), (c)(6)(ii), (g)(3)];

_____ (xi) have documented policy and procedures to ensure that its clients are served with impartiality and integrity.

(c) ***Quality system, audit and review***

(1) The laboratory shall:

_____ (i) have an established and maintained quality system appropriate to the type, range and volume of calibration and testing activities it undertakes;

_____ (ii) have the elements of the quality system documented;

_____ (iii) ensure that the quality documentation is available for use by the laboratory personnel;

_____ (iv) define and document its policies and objectives for, and its commitment to, good laboratory practice and quality of calibration or testing services;

_____ (v) have the laboratory management which ensures that these policies and objectives are documented in a quality manual and communicated to, understood, and implemented by all laboratory personnel concerned;

_____ (vi) ensure that the quality manual is maintained current under the responsibility of the quality manager [see also (c)(2)(iv)].

Date of quality manual: _____

Date of latest update: _____

(2) The quality manual, and related quality documentation, shall state the laboratory's policies and operational procedures established in order to meet the NVLAP requirements. The quality manual and related quality documentation shall contain:

_____ (i) a quality policy statement, including objectives and commitments, by top management;

_____ (ii) the organization and management structure of the laboratory, its place in any parent organization and relevant organizational charts;

_____ (iii) the relations between management, technical operations, support services and the quality system;

_____ (iv) procedures for control and maintenance of documentation [see also (c)(1)(vi), (j)(1)];

_____ (v) job descriptions of key staff and reference to the job descriptions of other staff;

_____ (vi) identification of the laboratory's approved signatories (list here or in the comments section): _____

_____

_____ (vii) the laboratory's procedures for achieving traceability of measurements;

_____ (viii) the laboratory's scope of calibrations and/or tests;

_____ (ix) written procedures for ensuring that the laboratory reviews all new work to ensure that it has the appropriate facilities and resources before commencing such work;

_____ (x) reference to the calibration, verification and/or test procedures used;

_____ (xi) procedures for handling calibration and test items;

_____ (xii) reference to the major equipment and reference measurement standards used;

_____ (xiii) reference to procedures for calibration, verification and maintenance of equipment;

_____ (xiv) reference to verification practices including interlaboratory comparisons, proficiency testing programs, use of reference materials and internal quality control schemes [see also (b)(2)(x), (c)(6)(ii), (g)(3)];

(xv) procedures to be followed for feedback and corrective action whenever:

_____ a) testing discrepancies are detected, or

_____ b) departures from documented policies and procedures occur;

_____ (xvi) the laboratory management policies for departures from documented policies and procedures or from standard specifications;

_____ (xvii) procedures for dealing with complaints [see also (n)];

_____ (xviii) procedures for protecting confidentiality and proprietary rights [see also (b)(2)(ix)];

_____ (xix) procedures for audit and review;

_____ (xx) a description of the laboratory's policy regarding the use of the NVLAP logo;

▸ _____ (xxi) a statement of the laboratory's policy for establishing and changing
▸ calibration intervals for equipment it controls; and

_____ (xxii) a statement of the laboratory's policy concerning the technique(s) to be used for determining measurement uncertainty and calibration/verification adequacy.

_____ (3) The laboratory shall arrange for audits of its activities at appropriate intervals to verify that its operations continue to comply with the requirements of the quality system. Such audits shall be carried out by trained and qualified staff who are, wherever possible, independent of the activity to be audited. Where the audit findings cast doubt on the correctness or validity of the laboratory's calibration or test results, the laboratory shall take immediate corrective action and shall immediately notify, in writing, any client whose work may have been affected.

The audits shall be objective and be conducted internally or on contract. The audits shall include both general criteria (documents, records and policies) and technical compliance (test methods and practices and calibration procedures).

_____ (4) The quality system adopted to satisfy the NVLAP requirements shall be reviewed at least once a year by the management to ensure its continuing suitability and effectiveness and to introduce any necessary changes or improvements.

_____ (5) All audit and review findings and any corrective actions that arise from them shall be documented. The person responsible for quality shall ensure that these actions are discharged within the agreed timescale.

(6) In addition to periodic audits the laboratory shall ensure the quality of results provided to clients by implementing checks. These checks shall be reviewed and shall include, as appropriate, but not be limited to:

_____ (i) internal quality control plans, such as control charts and other available statistical techniques;

NOTE: Measurement assurance techniques are acceptable means to control the measurement process and consistently produce the highest quality measurements.

_____ (ii) participation in proficiency testing or other interlaboratory comparisons [see also (b)(2)(x), (c)(2)(xiv), (g)(3)];

_____ (iii) regular use of certified reference materials and/or in-house quality control using secondary reference materials;

_____ (iv) replicate testings using the same or different methods;

_____ (v) retesting of retained items;

_____ (vi) correlation of results for different characteristics of an item.

(d) ***Personnel*** [see also (c)(2)(v)]

_____ (1) The testing laboratory shall have sufficient personnel, having the necessary education, training, technical knowledge and experience for their assigned functions.

_____ (2) The testing laboratory shall ensure that the training of its personnel is kept up-to-date.

_____ (3) Records on the relevant qualifications, training, skills and experience of the technical personnel shall be maintained by the laboratory.

(e) ***Accommodation (facilities) and environment*** [see also (i)(3)]

_____ (1) Laboratory accommodation, calibration and test areas, energy sources, lighting, heating and ventilation shall be such as to facilitate proper performance of calibrations or tests.

NOTE: Laboratory design will be, to the maximum extent practical, in accordance with the guidelines found in the NCSL Recommended Practice #7, *Laboratory Design*, July 25, 1993.

_____ (2) The environment in which these activities are undertaken shall not invalidate the results or adversely affect the required accuracy of measurement. Particular care shall be taken when such activities are undertaken at sites other than the permanent laboratory premises.

NOTE: It is expected that environments which do not meet generally accepted norms, such as those found in NCSL Recommended Practice #7, yet which exhibit the stability required to apply necessary correction factors, will be specified by the laboratory for the purpose of assessment of compliance with its own procedures to achieve its stated uncertainties.

_____ (3) The laboratory shall provide facilities for the effective monitoring, control and recording of environmental conditions as appropriate. Due attention shall be paid, for example, to biological sterility, dust, electromagnetic interference, humidity, voltage, temperature, and sound and vibration levels, as appropriate to the calibrations or tests concerned.

_____ (4) There shall be effective separation between neighboring areas when the activities therein are incompatible.

_____ (5) Access to and use of all areas affecting the quality of these activities shall be defined and controlled.

_____ (6) Adequate measures shall be taken to ensure good housekeeping in the laboratory.

NOTE: While it is the laboratory's responsibility to comply with relevant health and safety requirements, this is outside the scope of this assessment.

(f) *Equipment and reference materials*

(1) The laboratory shall:

_____ (i) be furnished with all items of equipment (including hardware, software, and reference materials) required for the correct performance of calibrations and tests;

_____ (ii) in those cases where the laboratory needs to use equipment outside its permanent control, including rented, leased and client-owned equipment, ensure that the relevant NVLAP requirements are met.

_____ (2) All equipment shall be properly maintained. Maintenance procedures shall be documented. Any item of the equipment which has been subjected to overloading or mishandling, or which gives suspect results, or has been shown by verification or otherwise to be defective, shall be taken out of service, clearly identified and wherever possible stored at a specified place until it has been repaired and shown by calibration, verification or test to perform satisfactorily. The laboratory shall examine the effect of this defect on previous calibrations or tests.

_____ (3) Each item of equipment including reference materials shall, when appropriate, be labelled, marked or otherwise identified to indicate its calibration status.

_____ (4) Records shall be maintained of each item of equipment and all reference materials significant to the calibrations or tests performed. The records shall include:

_____ (i) the name of the item of equipment, software or reference material;

_____ (ii) the manufacturer's name, type identification, and serial number or other unique identification;

_____ (iii) date received and date placed in service;

NOTE: For initial accreditation, the date received and the date placed in service are not considered mandatory requirements for inclusion in laboratory records, although this is encouraged as good laboratory practice.

_____ (iv) current location, where appropriate;

_____ (v) condition when received (e.g., new, used, reconditioned);

_____ (vi) copy of the manufacturer's instructions, where available;

_____ (vii) dates and results of calibrations and/or verifications and date of next calibration and/or verification;

_____ (viii) details of maintenance carried out to date and planned for the future;

_____ (ix) history of any damage, malfunction, modification or repair;

▸ _____ (x) measured value observed for each parameter found to be out of tolerance
▸ during calibration/verification.

(g) ***Measurement traceability and calibration***

_____ (1) All measuring and testing equipment having an effect on the accuracy or validity of calibrations or tests shall be calibrated and/or verified before being put into service. The laboratory shall have an established program for the calibration and verification of its measuring and test equipment. The program will ensure the recall or removal from service of any standard or equipment which has exceeded its calibration interval or is otherwise judged to be unreliable.

_____ (2) The overall program of calibration and/or verification and validation of equipment shall be designed and operated so as to ensure that, wherever applicable, measurements made by the laboratory are traceable to national standards of measurement where available. Calibration certificates shall, wherever applicable, indicate the traceability to national standards of measurement and shall provide the measurement results and associated uncertainty of measurement and/or a statement of compliance with an identified metrological specification.

NOTE: Traceability to national standards includes traceability to standards maintained or defined at national laboratories in foreign countries where applicable. In these cases, traceability is achieved via international standards. This includes intrinsic standards of measurement where available.

Where applicable, the methodology of the *Guide to the expression of uncertainty in measurement*: 1993, shall be used as the basis for expression of uncertainty of the measurement. NIST Technical Note 1297; January 1993, *Guidelines for Evaluating and Expressing the Uncertainty of NIST Measurement Results*, is a practical application document written around the *Guide to the expression of uncertainty in measurement*. Where detailed procedures are not used to quantify and combine uncertainties (i.e., use of test accuracy ratio concepts), the sources of uncertainty shall be tabulated and demonstrated to be acceptable for the measurement undertaken.

NOTE: A significant number of intrinsic standards, such as the Josephson Array Voltage Standard and the Iodine-Stabilized Helium-Neon Laser Length Standard, have been developed and are now being used by many national standards laboratories and some industrial laboratories. These standards are based on well-characterized laws of physics, fundamental constants of nature, or invariant properties of materials, and make ideal stable, precise, and accurate measurement standards if properly designed, characterized, operated, monitored and maintained. Where intrinsic standards are used, the laboratory should demonstrate by measurement assurance techniques, interlaboratory comparisons, or other suitable means, that its intrinsic standard measurement results are correlated with those of national or international standards.

_____ (3) Where traceability to national standards of measurement is not applicable, the laboratory shall provide satisfactory evidence of correlation of results, for example by participation in a suitable program of interlaboratory comparisons or proficiency testing [see also (b)(2)(x), (c)(2)(xiv), (c)(6)(ii)].

NOTE: Traceability requirements may also be satisfied by:

(i) internationally accepted standards in the field concerned;

(ii) suitable reference materials;

(iii) ratio or reciprocity measurements; or

(iv) mutual consent standards which are clearly specified and mutually agreed upon by all parties concerned.

_____ (4) Reference standards of measurement held by the laboratory shall be used for calibration only and for no other purpose, unless it can be demonstrated that their performance as reference standards has not been invalidated.

_____ (5) Reference standards of measurement shall be calibrated by a body that can provide traceability to a national standard of measurement. There shall be a program of calibration and verification for reference standards.

_____ (6) Where relevant, reference standards and measuring and testing equipment shall be subjected to in-service checks between calibrations and verifications.

_____ (7) Reference materials shall, where possible, be traceable to national or international standards of measurement, or to national or international standard reference materials.

(h) ***Calibration and test methods***

_____ (1) The laboratory shall have documented instructions on the use and operation of all relevant equipment, on the handling and preparation of items and for calibration and/or testing, where the absence of such instructions could jeopardize the calibrations or tests. All instructions, standards, manuals and reference data relevant to the work of the laboratory shall be maintained up-to-date and be readily available to the staff.

_____ (2) The laboratory shall use appropriate methods and procedures for all calibrations and tests and related activities within its responsibility (including sampling, handling, transport and storage, preparation of items, estimation of uncertainty of measurement and analysis of calibration and/or test data). They shall be consistent with the accuracy required, and with any standard specifications relevant to the calibrations or tests concerned.

NOTES:

(i) Calibration procedures shall contain the required range and tolerance or uncertainty of each item or unit parameter being calibrated or verified. In addition, the procedures shall contain the generic description of the measurement standards and equipment needed with the required parameter, range, tolerances or uncertainties, and specifications for performing the measurement of the calibration or verification, and/or representative types (manufacturer, model, option) that are capable of meeting the generic description for the measurement standards. The procedures shall be consistent with the accuracy required, and with any standard specifications relevant to the calibrations/verifications concerned.

(ii) The laboratory shall ensure that the calibration uncertainties are sufficiently small so that the adequacy of the measurement is not affected. Well-defined and documented measurement assurance techniques or uncertainty analyses may be used to verify the adequacy of a measurement process. If such techniques are not used, then the collective uncertainty of the measurement standards shall not exceed 25% of the acceptable tolerance (e.g., manufacturer's specification) for each characteristic of the measuring and test equipment being calibrated or verified.

_____ (3) Where methods are not specified, the laboratory shall, wherever possible, select methods that have been published in international or national standards, those published by reputable technical organizations or in relevant scientific texts or journals.

_____ (4) Where it is necessary to employ methods that have not been established as standard, these shall be subject to agreement with the client, be fully documented and validated, and be available to the client and other recipients of the relevant reports [see also (k)(2)(x)].

_____ (5) Where sampling is carried out as part of the test method, the laboratory shall use documented procedures and appropriate statistical techniques to select samples [see also (k)(2)(ix)].

_____ (6) Calculations and data transfers shall be subject to appropriate checks.

(7) Where computers or automated equipment are used for the capture, processing, manipulation, recording, reporting, storage or retrieval of calibration or test data, the laboratory shall have written procedures which ensure that:

_____ (i) the NVLAP requirements are complied with;

_____ (ii) computer software, computers or automated equipment is documented and adequate for use;

_____ (iii) procedures are established and implemented for protecting the integrity of data; such procedures shall include, but not be limited to, integrity of data entry or capture, data storage, data transmission and data processing;

_____ (iv) computer and automated equipment is maintained to ensure proper functioning and provided with the environmental and operating conditions necessary to maintain the integrity of calibration and test data [see also (f)(1)];

_____ (v) it establishes and implements appropriate procedures for the maintenance of security of data including the prevention of unauthorized access to, and the unauthorized amendment of, computer records.

_____ (8) Documented procedures shall exist for the purchase, reception and storage of consumable materials used for the technical operations of the laboratory [see also (m)(2)].

(i) ***Handling of calibration and test items***

_____ (1) The laboratory shall have a documented system for uniquely identifying the items to be calibrated or tested, to ensure that there can be no confusion regarding the identity of such items at any time [see also (k)(2)(v)].

_____ (2) Upon receipt, the condition of the calibration or test item, including any abnormalities or departures from standard condition as prescribed in the relevant calibration or test method, shall be recorded. Where there is any doubt as to the item's suitability for calibration or test, where the item does not conform to the description provided, or where the calibration or test required is not fully specified, the laboratory shall consult the client for further instruction before proceeding. The laboratory shall establish whether the item has received all necessary preparation, or whether the client requires preparation to be undertaken or arranged by the laboratory.

_____ (3) The laboratory shall have documented procedures and appropriate facilities to avoid deterioration or damage to the calibration or test item, during storage, handling, preparation, and calibration or test; any relevant instructions provided with the item shall be followed. Where items have to be stored or conditioned under specific environmental conditions, these conditions shall be maintained, monitored and recorded where necessary. Where a calibration or test item or portion of an item is to be held secure (for example, for reasons of record, safety or value, or to enable check calibrations or tests to be performed later), the laboratory shall have storage and security arrangements that protect the condition and integrity of the secured items or portions concerned [see also (e)].

_____ (4) The laboratory shall have documented procedures for the receipt, retention or safe disposal of calibration or test items, including all provisions necessary to protect the integrity of the laboratory.

_____ (5) Tamper-resistant seals shall be affixed to operator-accessible controls or adjustments on measurement standards or measuring and test equipment which, if moved, will invalidate the calibration. The laboratory's calibration system shall provide instructions for the use of such seals and for the disposition of equipment with damaged or broken seals.

NOTE: Tamper-resistant seals are sometimes affixed to equipment to prevent unauthorized access to areas where adjustments or critical components are located.

(j) *Records*

_____ (1) The laboratory shall maintain a record system to suit its particular circumstances and comply with any applicable regulations. It shall retain on record all original observations, calculations and derived data, calibration records and a copy of the calibration certificate, test certificate or test report for an appropriate period. The records for each calibration and test shall contain sufficient information to permit their repetition. The records shall include the identity of personnel involved in sampling, preparation, calibration or testing [see also (c)(2)(iv)].

▸ **EXCEPTION:** The retention of all original observations, calculations, and
▸ derived data in the calibration record system is not a mandatory requirement
▸ for calibration laboratories, although it is encouraged as good laboratory
▸ practice.

_____ (2) All records (including those listed in (f)(4) pertaining to calibration and test equipment), certificates and reports shall be safely stored, held secure and in confidence to the client [see also (b)(2)(ix), (c)(2)(xviii)].

NOTE: The period of retention shall be specified in the quality manual.

Record retention time specified: _____

(k) ***Certificates and reports***

_____ (1) The results of each calibration, test, or series of calibrations or tests carried out by the laboratory shall be reported accurately, clearly, unambiguously and objectively, in accordance with any instructions in the calibration or test methods. The results should normally be reported in a calibration certificate, test report or test certificate and should include all the information necessary for the interpretation of the calibration or test results and all information required by the method used [see also (k)(4)(i)].

NOTE: It is recognized that the results of each calibration do not always result in the production of a calibration certificate or report. Whenever a certificate or report is produced, the above requirements shall be met.

(2) Each certificate or report shall include at least the following information:

_____ (i) a title, e.g., "Calibration Certificate," "Test Report" or "Test Certificate";

_____ (ii) name and address of laboratory, and location where the calibration or test was carried out if different from the address of the laboratory;

_____ (iii) unique identification of the certificate or report (such as serial number) and of each page, and the total number of pages;

_____ (iv) name and address of client, where appropriate;

_____ (v) description and unambiguous identification of the item calibrated or tested [see also (i)(1)];

_____ (vi) characterization and condition of the calibration or test item;

_____ (vii) date of receipt of calibration or test item and date(s) of performance of calibration or test, where appropriate;

EXCEPTION: Although it is encouraged as good laboratory practice, the requirement for inclusion of the date received is not mandatory for calibration laboratories.

_____ (viii) identification of the calibration or test method used, or unambiguous description of any non-standard method used;

_____ (ix) reference to sampling procedure, where relevant [see also (h)(5)];

_____ (x) any deviations from, additions to or exclusions from the calibration or test method, and any other information relevant to a specific calibration or test, such as environmental conditions [see also (c)(2)(xv), (h)(4)];

_____ (xi) measurements, examinations and derived results, supported by tables, graphs, sketches and photographs as appropriate, and any failures identified;

_____ (xii) a statement of the estimated uncertainty of the calibration or test result, where relevant;

_____ (xiii) a signature and title, or an equivalent identification of the person(s) accepting responsibility for the content of the certificate or report (however produced), and date of issue [see also (c)(2)(vi)];

_____ (xiv) where relevant, a statement to the effect that the results relate only to the items calibrated or tested;

_____ (xv) a statement that the certificate or report shall not be reproduced except in full, without the written approval of the laboratory;

_____ (xvi) a statement that the report must not be used by the client to claim product endorsement by NVLAP or any agency of the U.S. Government;

_____ (xvii) the signature of an approved signatory for all test and calibration reports endorsed with the NVLAP logo;

▸ _____ (xviii) special limitations of use; and

▸ _____ (xix) traceability statement.

_____ (3) Where the certificate or report contains results of calibrations or tests performed by subcontractors, these results shall be clearly identified [see also (l)].

_____ (4) Particular care and attention shall be paid to the arrangement of the certificate or report, especially with regard to presentation of the calibration or test data and ease of assimilation by the reader. The format shall be carefully and specifically designed for each type of calibration or test carried out, but the headings shall be standardized as far as possible [see also (k)(1)].

_____ (5) Material amendments to a calibration certificate, test report or test certificate after issue shall be made only in the form of a further document, or data transfer including the statement "Supplement to Calibration Certificate (or Test Report or Test Certificate), serial number ... (or as otherwise identified)," or equivalent form of wording. Such amendments shall meet all the relevant requirements of item (j).

_____ (6) The laboratory shall notify clients promptly, in writing, of any event such as the identification of defective measuring or test equipment that casts doubt on the validity of results given in any calibration certificate, test report, or test certificate or amendment to a report or certificate.

NOTE: Such notification shall quantify the magnitude of error created in the calibration results. The laboratory shall notify customers promptly, in writing, of any customer's measuring and test equipment found significantly out of tolerance during the calibration/verification process. Measurement data shall be reported so that appropriate action can be taken.

_____ (7) The laboratory shall ensure that, where clients require transmission of calibration or test results by telephone, telex, facsimile or other electronic or electromagnetic means, staff will follow documented procedures that ensure that the NVLAP requirements are met and that confidentiality is preserved.

_____ (8) Whenever a laboratory accredited by NVLAP issues a calibration or test report which contains data covered by the accreditation and also data not covered by the accreditation, it must clearly identify in its records, and in the report to the client, specifically which calibration or test method(s), or portion of a calibration or test method(s), was not covered by the accreditation. The laboratory must also inform the client, before the fact, when calibrations or tests requested are not covered by the accreditation.

NVLAP policy regarding calibration and test reports issued by an accredited laboratory, which reference the laboratory's accredited status, requires that any calibration or test report containing data from calibrations or tests which are not covered by the accreditation include:

_____ (i) a statement at the beginning of the report prominently indicating, "This report contains data which are not covered by the NVLAP accreditation"; and

_____ (ii) a clear indication of which data are not covered by the accreditation.

The laboratory must not misrepresent its accreditation. When a client requires or requests accredited services and any of the requested services are not covered by the accreditation, the client must be so advised.

(l) ***Subcontracting of calibration or testing*** [see also (k)(3)]

_____ (1) Where a laboratory subcontracts any part of the calibration or testing, this work shall be placed with a laboratory complying with these requirements. The laboratory shall ensure and be able to demonstrate that its subcontractor is competent to perform the activities in question and complies with the same criteria of competence as the laboratory in respect of the work being subcontracted. The laboratory shall advise the client in writing of its intention to subcontract any portion of the testing to another party.

_____ (2) The laboratory shall record and retain details of its investigation of the competence and compliance of its subcontractors and maintain a register of all subcontracting.

_____ (3) A NVLAP-accredited laboratory intending to subcontract testing or calibration work that will be performed and reported as meeting NVLAP procedures and criteria must:

_____ (i) have in its quality manual a subcontracting policy compatible with the NVLAP policy, with a description of the procedures for administering and implementing those actions to demonstrate the conformance and consistency of the subcontracted laboratory to perform according to NVLAP procedures;

_____ (ii) place the subcontracted work with a laboratory that maintains accreditation established by NVLAP shown by a current NVLAP Lab Code, or provide and maintain current records that demonstrate that the subcontracted laboratory is competent to perform the test(s) or calibration(s) and that it operates in a manner consistent with and in conformance to NVLAP criteria for accreditation;

_____ (iii) clearly identify in its records, and in the report to the client, exactly which data were obtained by the NVLAP-accredited laboratory and which data were obtained by the subcontractor, NVLAP-accredited or not;

_____ (iv) inform its client, before the fact, that it intends to subcontract for completion of all or a portion of the client's work; and

_____ (v) include at the beginning of the report the name, address, and contact person of the subcontracted laboratory(ies), and one of the following statements, as appropriate:

if NVLAP-accredited

"This report contains data which were produced by a subcontracted laboratory **ACCREDITED (NVLAP LAB CODE)** for the calibration or test methods performed"

if not NVLAP-accredited

"This report contains data which were produced by a subcontracted laboratory **NOT ACCREDITED** for the calibration or test methods performed."

The requirements of this section do not supersede any regulation, law, contract specification, or other related conditions which require NVLAP accreditation.

(m) ***Outside support services and supplies***

_____ (1) Where the laboratory procures outside services and supplies in support of calibrations or tests, the laboratory shall use only those outside support services and supplies that are of adequate quality to sustain confidence in the laboratory's calibrations or tests.

_____ (2) Where no independent assurance of the quality of outside support services or supplies is available, the laboratory shall have procedures to ensure that purchased equipment, materials and services comply with specified requirements. The laboratory should, wherever possible, ensure that purchased equipment and consumable materials are not used until they have been inspected, calibrated or otherwise verified as complying with any standard specifications relevant to the calibrations or tests concerned [see also (h)(8)].

_____ (3) The laboratory shall maintain records of all suppliers from whom it obtains support services or supplies required for calibrations or tests.

(n) ***Complaints*** [see also (c)(2)(xvii)]

_____ (1) The laboratory shall have documented policy and procedures for the resolution of complaints received from clients or other parties about the laboratory's activities. A record shall be maintained of all complaints and of the actions taken by the laboratory.

_____ (2) Where a complaint, or any other circumstance, raises doubt concerning the laboratory's compliance with the laboratory's policies or procedures, or with the NVLAP requirements or otherwise concerning the quality of the laboratory's calibrations or tests, the laboratory shall ensure that those areas of activity and responsibility involved are promptly audited in accordance with item (c)(3).

(o) ***Measuring and test equipment (M & TE)***

NOTE: This section applies to the control of measuring and test equipment (M & TE) used to assure that supplies and services comply with prescribed customer requirements. It is based in large part on the requirements found in government audit standards such as MIL-STD 45662A, and is found in Part II of the ANSI/NCSL Z540-1-1994 (Draft) standard.

(1) General requirements for M & TE

_____ (i) The supplier shall establish and document a system to control the calibration/verification of M & TE.

_____ (ii) M & TE used to determine compliance with customer technical specifications shall be calibrated or verified in accordance with sections 285.33(b) through (n).

_____ (iii) The supplier shall have a program to recall for calibration or verification, or remove from service, M & TE that has exceeded its calibration interval, has broken calibration seals, or is suspected to be malfunctioning because of mishandling, misuse, or unusual results.

_____ (iv) All operations performed by the supplier in compliance with these requirements shall be subject to customer verification at unscheduled intervals.

_____ (v) The supplier shall carry out, or arrange to have carried out, periodic quality auditing of the calibration and verification system in order to ensure its continuing effective implementation and compliance with these requirements.

- Based on the results of the audits and any other relevant factors, such as customer feedback, the supplier shall review and modify the system as necessary.

- Plans and procedures for the audits shall be documented. The conduct of the audit and any subsequent corrective action shall also be documented.

(2) Detailed requirements for M & TE

_____ (i) Calibration system description: The supplier shall provide and maintain a written description of the calibration/verification system covering M & TE and measurement standards. The description shall be sufficient to satisfy each requirement of section 285.33(o) and any deviations shall be submitted with supporting documentation to the customer for approval.

_____ (ii) Adequacy of measurement standards: Measurement standards used by the supplier for calibrating M & TE and other measurement standards shall comply with the requirements of items (f)(1), (g)(1), and (h)(2).

_____ (iii) Environmental conditions: M & TE shall be used in an environment controlled to the extent necessary to ensure valid results. Due consideration shall be given to temperature, humidity, lighting, vibration, dust control, cleanliness, electromagnetic interference and any other factors affecting the results of measurements. Where pertinent, these factors shall be monitored and recorded and, when appropriate, correcting compensations shall be applied to measurement results.

_____ (iv) Intervals of calibration and verification: M & TE requiring calibration shall be calibrated or verified at periodic intervals established and maintained to assure acceptable reliability, where reliability is defined as the probability that M & TE will remain in-tolerance throughout the interval. Intervals shall be established for all M & TE requiring calibration unless the equipment is regularly monitored through the use of check standards in a documented measurement assurance process. Check standards must closely represent the item parameters normally tested in the process and the check standard must be verified periodically. Where intervals are used to ensure reliability, the interval setting system must be systematically applied and shall have stated reliability goals and a method of verifying that the goals are being attained. Intervals may be based on usage or time since last calibration or verification. All exemptions from periodic calibration or verification shall be documented. The recall system may provide for the temporary extension of the calibration due date for limited periods of time under specified conditions that do not unreasonably impair the satisfaction of the customer's requirements.

_____ (v) Calibration procedures: Procedures used to calibrate/verify the supplier's M & TE shall comply with the requirements of items (h)(1) and (h)(2).

_____ (vi) Out-of-tolerance conditions: If any M & TE is found to be significantly out of tolerance during the calibration/verification process, the supplier's system shall provide for notification to the user and to the supplier's quality element, if appropriate, of the out-of-tolerance condition with the associated measurement data so that appropriate action can be taken.

_____ (vii) Adequacy of calibration system: The supplier shall establish and maintain documented procedures to evaluate the adequacy of the calibration system and to ensure compliance with these requirements.

_____ (viii) Calibration sources: M & TE requiring calibration shall be calibrated or verified by laboratories that comply with sections 285.33(b) through (n).

_____ (ix) Records: These requirements shall be supported by records documenting that established schedules and procedures are followed to maintain the adequacy of all M & TE. The records for M & TE requiring calibration shall include an individual record of calibration or verification, or other means of control, providing a description or identification of the item, calibration interval, date calibrated, identification of the calibration source, calibration results (data and/or condition status) and calibration action taken (adjusted, repaired, new value assigned, derated, etc.).

_____ (x) Calibration status: M & TE shall be labeled to indicate calibration or verification status. The label shall identify specific date calibrated (day, month, year, Julian date, or equivalent) and the specific calibration due date or usage equivalent. Items not calibrated to their full capability or which have other limitations of use, shall be labeled or otherwise identified as to the limitations. When it is impractical to apply a label directly to an item, the label may be affixed to the instrument container or some other suitable means may be used to reflect calibration status. Tamper-resistant seals are affixed to operator accessible controls or adjustments which if moved will invalidate the calibration. The quality system shall provide instructions for the disposition of equipment with broken tamper-resistant seals.

_____ (xi) Control of subcontractor calibration: The supplier is responsible for assuring that the subcontractor's calibration system conforms to section 285.33 (l) to the degree necessary to assure compliance with contractual requirements. NVLAP accreditation of the subcontractor's laboratory can serve as the basis for compliance with this requirement.

_____ (xii) Storage and handling: M & TE shall be handled, stored, and transported in a manner which shall not adversely affect the calibration or condition of the equipment.

NVLAP LAB CODE:

GENERAL OPERATIONS CHECKLIST - COMMENTS AND DEFICIENCIES

Instructions to the Assessor: Use this sheet to document comments and deficiencies. For each, identify the appropriate item number from the checklist. Identify comments with a "C" and deficiencies with an "X." If additional space is needed, make copies of this page (or use additional blank sheets).

Item No.	*Comments and/or Deficiencies*

GENERAL OPERATIONS CHECKLIST - COMMENTS AND DEFICIENCIES

Instructions to the Assessor: Use this sheet to document comments and deficiencies. For each, identify the appropriate item number from the checklist. Identify comments with a "C" and deficiencies with an "X." If additional space is needed, make copies of this page (or use additional blank sheets).

Item No.	*Comments and/or Deficiencies*

APPENDIX C

SPECIFIC OPERATIONS CHECKLIST

NVLAP LAB CODE: [ ]

National Voluntary Laboratory Accreditation Program (NVLAP)
for
GOSIP Conformance Testing

SPECIFIC OPERATIONS CHECKLIST

Abstract

This checklist is designed for use by a NVLAP Technical Expert(s) (TE) during the conduct of an on-site assessment for initial or renewal of accreditation for GOSIP conformance testing. The checklist contains items from the program handbook, NVLAP Procedures, and technical references. The checklist is organized into sections similar to the program handbook and Procedures.

The completed checklist becomes a part of the laboratory ON-SITE ASSESSMENT REPORT which is used in the evaluation of the laboratory for granting or renewal of accreditation. Deficiencies noted in this checklist must be resolved in accordance with the NVLAP Procedures. Comments not specified as deficiencies may be directed to the laboratory.

Laboratory Name _____

NVLAP Technical Expert(s) _____

On-Site Dates _____

Place Where Demonstration Took Place _____

Instructions to Laboratory

Respond in writing within 30 days of the date of this report, addressing all deficiencies documented by the assessor. Each deficiency must be referenced, in your response, by number as it is listed in the report.

This on-site assessment report conveys the opinion of the assessor as a single representative of NVLAP. The final evaluation of your laboratory for the purpose of recommending approval or denial of accreditation will be conducted by NIST evaluators who will review this report, the written information submitted by you, and results of any required proficiency testing. You must respond to this report by identifying the actions you have taken, or plan to take, to correct the deficiencies identified. Respond in detail so that an accurate evaluation can be completed. Failure to respond may delay an accreditation decision. Questions concerning this report should be directed to NVLAP.

The assessor has discussed the contents of this report with members of the laboratory management who agree to respond in writing to NIST, regarding resolution or correction of any deficiencies noted, within 30 days of the date of this report.

_____

Signature of Authorized Representative or designee | Printed Name | Date

GOSIP SPECIFIC OPERATIONS CHECKLIST

Instructions to the Assessor: The specific criteria for this LAP are addressed in the following GOSIP Specific Operations Checklist. The Specific Checklist is to be used in conjunction with the NVLAP General Operations Checklist. The Specific Checklist is divided into the sections:

1 Test Laboratory Manager
2 Test Laboratory Quality Manager
3 Approved Signatory
4 Quality Manual
5 Facilities and Records
6 Conformance Testing Capabilities.

Place an "X" beside any of the checklist items which represent a deficiency. Place a "C" beside each item on which you are commenting for other reasons. Record the item number and your deficiency explanation and/or comments on the appropriate comment sheet(s).

The Specific Operations Checklist is for use in structuring the assessment and for recording observations. As such, it is not necessary to address every item. To show that an item has been addressed, place an "X," a "C," or a checkmark as appropriate. Do not mark items that have not been addressed.

1 TEST LABORATORY MANAGER CHECKLIST

NIST Handbook 150, Sec. 285.33 Criteria for accreditation, (b) Organization and management, (2) The laboratory shall: (i) have managerial staff with the authority and resources needed to discharge their duties; (vi) have a technical manager (however named) who has overall responsibility for the technical operations;.

_____ 1.1 The assessor should review with the Test Laboratory Manager the purpose of the interview.

_____ 1.2 The assessor should review the Test Laboratory Manager's personnel file and résumé prior to the interview.

_____ 1.3 Test Laboratory Manager's name:

_____ 1.4 Job title:

_____ 1.5 Ask the Test Laboratory Manager to describe his/her duties as they relate to the laboratory.

_____ 1.6 Is the description given by the Test Laboratory Manager consistent with what is in the personnel records and résumé?

_____ 1.7 For those aspects of the test laboratory function for which the Test Laboratory Manager is not responsible, ask who is responsible and record the answers below:

Deputy Test Laboratory Manager

Quality Assurance/Management

Test Operations

Systems Management

Recordkeeping/Librarian

_____ 1.8 Does the Test Laboratory Manager have other duties or responsibilities which are not a part of the laboratory?

_____ 1.9 Do these additional responsibilities conflict with test laboratory responsibilities? If so, how?

_____ 1.10 Is the Test Laboratory Manager familiar with ISO/IEC 9646 and in particular, the 9646-5 process of conformance assessment? Ask the Test Laboratory Manager to give an overview of the process.

_____ 1.11 Ask the following questions:

What do you understand by quality in testing?

How do you ensure Repeatability and Reproducibility?

(a) consistently by different members of staff?

(b) consistently over different test methods?

(c) consistently over successive test campaigns by the same staff?

Is there a checklist to help with this consistency?

2 TEST LABORATORY QUALITY MANAGER CHECKLIST

NIST Handbook 150, Sec. 285.33 Criteria for accreditation, (b) Organization and management, (2) The laboratory shall: (vii) have a quality manager (however named) who has responsibility for the quality system and its implementation ....

_____ 2.1 The assessor should review with the Quality Manager the purpose of the interview.

_____ 2.2 The assessor should review the Quality Manager's personnel file and résumé prior to the interview.

_____ 2.3 Quality Manager's name:

_____ 2.4 Job title:

_____ 2.5 Ask the Quality Manager to describe his/her duties as they relate to the laboratory.

_____ 2.6 Is the description given by the Quality Manager consistent with what is in the personnel records and résumé?

_____ 2.7 Ask the following questions:

What do you understand by quality in testing?

How do you ensure Repeatability and Reproducibility?

(a) consistently by different members of staff?

(b) consistently over different test methods?

(c) consistently over successive test campaigns by the same staff?

Is there a checklist to help with this consistency?

_____ 2.8 Are there procedures for performing formal quality assessments of the laboratory? Is there a checklist?

_____ 2.9 When was the last formal internal quality audit performed? How often are they performed?

_____ 2.10 Were there any deficiencies found? Please provide records. Have the deficiencies been resolved? What time scale is allowed for resolution of deficiencies?

_____ 2.11 Are there procedures for performing informal/impromptu quality audits of the laboratory?

_____ 2.12 When was the last informal quality audit performed? How often are they performed?

_____ 2.13 Were there any deficiencies found? Please provide records. Have the deficiencies been resolved?

3 APPROVED SIGNATORY CHECKLIST

NIST Handbook 150, Sec. 285.5 Definitions, Approved Signatory (of an accredited laboratory): An individual who is recognized by NVLAP as competent to sign accredited laboratory calibration or test reports. NOTE: The Approved Signatory is responsible for technical content of the report ....

_____ 3.1 The assessor should review with at least one Approved Signatory the purpose of the interview.

_____ 3.2 The assessor should review the Approved Signatory's personnel and résumé prior to the interview.

_____ 3.3 Approved Signatory's name:

_____ 3.4 Job title:

_____ 3.5 Ask the Approved Signatory to describe his/her duties as they relate to the laboratory.

_____ 3.6 Is the description given by the Approved Signatory consistent with what is in the personnel file and résumé?

_____ 3.7 For those aspects of the test laboratory function for which the Approved Signatory is not responsible, ask who is responsible and record the answers below:

NVLAP Authorized Representative

Test Laboratory Manager

Quality Assurance/Management

Test Operations

Systems Management

Recordkeeping/Librarian

_____ 3.8 Does the Approved Signatory have other duties or responsibilities which are not a part of the laboratory?

_____ 3.9 Do these additional responsibilities conflict with test laboratory responsibilities? If so, how?

_____ 3.10 Is the Approved Signatory familiar with ISO/IEC 9646 and, in particular, the 9646-5 process of conformance assessment? Ask the Approved Signatory to give an overview of the process.

_____ 3.11 Ask the following questions:

What do you understand by quality in testing?

How do you ensure Repeatability and Reproducibility?

(a) consistently by different members of staff?

(b) consistently over different test methods?

(c) consistently over successive test campaigns by the same staff?

Is there a checklist, to help with this consistency?

4 QUALITY MANUAL CHECKLIST

This checklist is to be used when reviewing the quality and procedures manuals. Where applicable, record the section number of the laboratory quality manual that addresses the following checklist items.

4.1 QUALITY MANUAL KEY ELEMENTS

Does the quality manual address or contain:

_____ 4.1.1 The laboratory's quality assurance policies including procedures for detecting test discrepancies and for corrective action in response thereto.

_____ 4.1.2 Laboratory function description and quality assurance responsibilities for each NVLAP-accredited function.

_____ 4.1.3 Laboratory organizational structure.

_____ 4.1.4 Staff position descriptions and titles as they relate to the organizational structure. Procedures for maintenance and improvement of staff competence.

_____ 4.1.5 Test equipment inventory, and calibration procedures and records (or a pointer to where these are kept).

_____ 4.1.6 Specific procedures for the conformance assessment process. These shall reference, duplicate or be strongly related to ISO/IEC 9646.

_____ 4.1.7 Recordkeeping.

_____ 4.1.8 Error and complaint handling procedures.

_____ 4.19 Quality system audit procedure.

4.2 QUALITY POLICY AND QUALITY ASSURANCE

Although quality policy and quality assurance are treated as one section in this checklist, they need not necessarily be part of the same section in the quality manual. Quality assurance procedures may be spread throughout the manual. It is the job of the assessor to determine whether or not the procedures as a whole are adequate to give NVLAP confidence that the testing will be performed in a manner which ensures that the testing will be reliable and repeatable.

_____ 4.2.1 Does the quality policy state the objectives of the test laboratory with respect to maintaining the reliability and repeatability of test results?

_____ 4.2.2 Is the quality policy consistent with other company policies?

_____ 4.2.3 Do the quality program and test laboratory procedures as described in the quality manual generally support the objectives of the quality policy?

_____ 4.2.4 Is there a reference, either in the quality policy statement or elsewhere in the manual, to the title of the person responsible for implementing the quality program?

_____ 4.2.5 Is there an individual responsible for quality audits? Each staff member has some degree of responsibility for self audit. There may, however, be an individual outside of the laboratory who would conduct an audit of the test laboratory.

_____ 4.2.6 Is there a process for internal audits of the procedures for testing and for quality? The audits should be both formal and informal.

_____ 4.2.7 Is the process generally proactive such that quality is constantly being monitored and adjustments made to the procedures to ensure ongoing improvements?

_____ 4.2.8 Do the quality system audit procedures cover audits in the event of: changes to staff; changes to scope of accreditation; changes to facilities and equipment?

_____ 4.2.9 Are there procedures for keeping NVLAP informed of major changes to the test laboratory or its quality system?

_____ 4.2.10 Does the audit process address corrective action such as the updating of the quality and procedures manuals?

4.3 LABORATORY DESCRIPTION INCLUDING SCOPE OF WORK

_____ 4.3.1 Is the test laboratory legally identifiable or part of a legally identifiable organization?

_____ 4.3.2 If the laboratory has other accreditations for which the quality manual is used, are they listed in the quality manual?

_____ 4.3.3 Does the quality manual clearly state the scope of work which the test laboratory is to perform under its accredited status (list of specific Means of Testing)? This should include all Means of Testing which were listed on the application form.

4.4 LABORATORY ORGANIZATIONAL STRUCTURE

_____ 4.4.1 Is an overall organizational chart included in the manual?

_____ 4.4.2 Does the organizational chart show the relationship of the test laboratory to other corporate functions?

_____ 4.4.3 Does the test laboratory's position in the organization delineate the laboratory from other functions which may influence the testing? If this is not clear from the organizational chart, the assessor should request a written or verbal description of each functional unit within the organization.

_____ 4.4.4 Are there job descriptions for the positions listed in the organization chart? The position descriptions should prescribe the extents and limitations of individual responsibilities and define the lines of authority.

4.5 STAFF POSITION DESCRIPTIONS, TRAINING AND QUALIFICATIONS

_____ 4.5.1 Do the position descriptions clearly state the responsibilities of the staff?

_____ 4.5.2 Is the extent of responsibility of each position clear from the position descriptions?

_____ 4.5.3 Do the position descriptions state the staff qualifications for the positions?

_____ 4.5.4 Do the job descriptions fulfill the requirements of a Conformance Test Laboratory (i.e., do the roles performed by the staff encompass the process described in ISO/IEC 9646-5)?

_____ 4.5.5 Are there individuals employed in the test laboratory whose responsibilities match the job descriptions from the organizational chart?

_____ 4.5.6 Does the quality manual reference a staff training scheme?

_____ 4.5.7 Does the training include specific external or internal, classes or modules on:

Laboratory Operation

Test Methodology

OSI Protocol Expertise

Systems Knowledge

Test Systems Training

_____ 4.5.8 Does the training include a laboratory mentoring scheme, in which there are defined relationships within the staff for passing on specific knowledges to junior staff, and to peers who are broadening their scopes?

_____ 4.5.9 Is the Approved Signatory in a position within the organization which allows him/her to adequately attest that testing was conducted in a manner consistent with the criteria for accreditation?

_____ 4.5.10 Is the Test Laboratory Manager in a position within the organization which allows him/her to adequately ensure quality as it relates to the overall, day-to-day operation of the laboratory?

4.6 TEST EQUIPMENT INVENTORY, CALIBRATION PROCEDURES AND RECORDS

_____ 4.6.1 Is there a list which includes a description, manufacturer, serial number, location and intended use of all major items of testing equipment?

_____ 4.6.2 Is there equipment in the inventory which requires calibration? If so, are there procedures for calibrating this equipment? If calibration is done per manufacturers' recommendations, what are they? Has the lab shown a past performance of calibration according to these recommendations?

_____ 4.6.3 Is the equipment on a maintenance contract? If not, what are the laboratory's procedures for acquiring maintenance when needed? This should include procedures for verifying/calibrating equipment which has been taken out of service for maintenance.

_____ 4.6.4 Are there calibration and maintenance records?

_____ 4.6.5 Is there special equipment or environmental considerations for the method of test, and if so, are these addressed in the quality manual?

_____ 4.6.6 Is the equipment under the direct supervision of the Test Laboratory Manager or are there procedures in place for allocating use of the equipment which ensure that the laboratory has resources available to conduct testing?

_____ 4.6.7 Is there certain equipment which only certain individuals are authorized to use?

_____ 4.6.8 Are there procedures for test system configuration control and other general systems administration duties?

_____ 4.6.9 Does the laboratory contain sufficient computer equipment including the following:

Ability to communicate in real-time with any or all SUTs scheduled.

Terminals and printers to support scheduled clients.

On-line backing store to support generated log files for each client (get specific numbers for specific SUT requirements).

_____ 4.6.10 Select one piece of equipment and request a complete history of what has been done with this system. Verify that the explanation is compliant with the maintenance procedures.

4.7 SPECIFIC PROCEDURES FOR THE CONFORMANCE ASSESSMENT PROCESS

Are there procedures for:

_____ 4.7.1 Exchange of information, including the general timelines for testing, and is the client made aware of the timelines?

_____ 4.7.2 Handling scheduling slips? Is the client made aware of the ramifications of slips in schedules?

_____ 4.7.3 Receipt of client equipment and recording of SUT/IUT and other client information?

_____ 4.7.4 Storage of client equipment (if applicable)?

_____ 4.7.5 Analyzing PICS and PIXIT information and recording observations (automated or otherwise)?

_____ 4.7.6 Providing the client with the results of static analysis? This should include policy and procedure for incomplete PICS and/or PIXIT information as well as non-conformant PICS.

_____ 4.7.7 The client's updating or changing PICS or PIXIT information? Generally, the client should not be allowed to change PICS information once testing has begun. Depending on its nature, PIXIT information may change if incorrectly entered (e.g., typographical error).

_____ 4.7.8 Handling complaints or disputes over the results of static conformance review?

_____ 4.7.9 Selecting test cases based on PICS and PIXIT information? If automated, this should be mentioned. The procedure should include a requirement for documented justification of tests not selected.

_____ 4.7.10 Ensuring repeatability of test case selection?

_____ 4.7.11 Parameterizing the test cases and verifying the correctness of the parameterization?

Are there also procedures for executing the test campaign, including:

_____ 4.7.12 Ensuring that the test engineer is not influenced by the client? In general, the client and test engineer should discuss only those aspects of testing required to set up a test and execute it. The test engineer should not discuss results of a test until such time as a final report has been issued. Even at this point it is appropriate for the Test Laboratory Manager to handle disputes.

_____ 4.7.13 Handling abnormal test case termination?

_____ 4.7.14 Tracking and logging test data so that test data from different IUTs or different test campaigns from the same IUT are not confused?

_____ 4.7.15 Recording observations during test execution?

_____ 4.7.16 Handling changes to the test environment during the test campaign? In particular, the procedures should address changes to the IUT software or hardware, changes to the PICS and/or PIXIT information, changes to the upper or lower tester. These procedures should include documenting the change, retest criteria and procedures for reestablishing a testing context/environment.

_____ 4.7.17 Retest? Failed or inconclusive tests may be rerun to see if they failed due to failure to execute preamble or initiation tests (tests which place the IUT or tester into a given state) or due to timer expiration. The reason for retest and any changes to the PIXIT information is to be recorded and marked as an observation in the PCTR.

_____ 4.7.18 Negotiated exits? The procedure should record, at a minimum, the reason for exit, at what point the exit occurred, and the conditions for reentry. There should be procedures for reestablishing the test environment upon reentry of the IUT.

_____ 4.7.19 Analyzing test data and assigning verdicts such that the verdict is consistent with the PICS claims?

_____ 4.7.20 Verifying failed verdicts and documenting the reason for fails?

_____ 4.7.21 Resolving inconclusive verdicts? The justification for inconclusive being resolved to PASS or FAIL must be documented as an observation. If the inconclusive is left as such, the reason for its being inconclusive is also to be marked as an observation.

____ 4.7.22 Completing the PCTR?

____ 4.7.23 Handling disputes and challenges to test results? The dispute should remain at the test laboratory level unless the problem lies with the test system, the test case(s), the standards or the implementor agreements. In these cases, the MOT Supplier, and/or CSL and/or JITC are to be notified.

____ 4.7.24 Recording verdicts, observations, and other pertinent information about the test campaign? There should be a sufficient audit trail to recreate the test environment and to reexecute a test as it was first conducted. This includes:

All relevant documents/processes in place for a test campaign (ATS, QA, MOTs, Defect Reports, Operational Documentation, Profiles, Version Numbers).

All relevant information concerning the SUT (Hardware, Software, OS, Serial and Version Numbers).

All findings during all the steps of the test campaign.

Interface commands, file creation.

____ 4.7.25 Adherence to procedures. What is the process in place in the laboratory which defines how the Approved Signatory makes decisions concerning the filing of test campaign documentation and its adherence to the laboratory quality and technical procedures (e.g., is there a checklist used by the Signatory to make these decisions?).

4.8 DOCUMENTATION MAINTENANCE

_____ 4.8.1 General procedures. Are there any procedures defining the way all documents are treated in the laboratory (e.g., Engineer X responsible for maintaining document, any new release must be approved and signed by 2 staff before being put in place in the laboratory)?

_____ 4.8.2 Abstract Test Suites. Are there specific procedures for maintaining ATS, documenting changes in ATS, including bug fixes, and approving their use in test campaigns?

_____ 4.8.3 Quality Assurance. Are there specific procedures to maintain/improve the QA system?

_____ 4.8.4 Operational Documentation. For each technical area, are there generic or specific maintenance procedures for the relevant operational documents?

_____ 4.8.5 Profiles and Standards. Are there procedures for retaining old copies of Implementors Agreements and ISO, CCITT, and ITU standards, cross-referenced by old test campaigns? Are there procedures for updating the library of current standards/profiles?

_____ 4.8.6 Select one document, and require a complete history of the evolution of the document. Verify that the process is compliant with the defined procedures.

4.9 RECORDKEEPING

_____ 4.9.1 Is there in place a mechanism for archiving PICS, PIXIT, test data, PCTR and SCTR such that these documents and data may be referred to unambiguously and may be readily retrieved as needed?

_____ 4.9.2 Is the facility for storing test results and test data secure from tampering, and is the facility adequate for ensuring client confidentiality?

_____ 4.9.3 Are there procedures in place for archiving data on magnetic media (if archived)?

_____ 4.9.4 Are the procedures and facilities adequate for long-term storage of records? How long are the records stored?

_____ 4.9.5 Archive retention time?

5 FACILITIES AND RECORDS CHECKLIST

5.1 DOCUMENTATION

Ensure that the documents which are relevant to the function of a GOSIP Conformance Laboratory are held by the laboratory, and accessible to members of staff as appropriate. Check off documents available according to the list that follows.

_____ 5.1.1 Is the documentation in a location which makes it available to the staff?

_____ 5.1.2 What are the sources for documents used in the test lab? Are the addresses of the originating organizations known such that new documents can be acquired easily?

_____ 5.1.3 Select one document and require a complete history of the evolution of the document. Verify that the process is compliant with the defined procedures.

5.1.4 **Certification/Registration Authority Documents**

_____ Government Open Systems Interconnection Profile (GOSIP), Federal Information Processing Standard (FIPS) 146.

_____ Government Open Systems Interconnection Profile (GOSIP), Federal Information Processing Standard (FIPS) 146-1.

_____ The Industry Government Open Systems Specification (IGOSS), NIST Special Publication 500-217, May 1994.

_____ Industry Government Open Systems Specification Testing Framework, Version 1.0, NISTIR 5438, June 1994.

_____ Means of Testing, Part 1, Validation Methodology, October 1994, or later.

_____ Means of Testing, Part 2, Detail Validation and Reporting Procedures, October 1994, or later.

_____ Means of Testing, Part 3, Updating the Validation, October 1994, or later.

5.1.5 **Laboratory Accreditation and Quality System Documents**

_____ NIST Handbook 150, *National Voluntary Laboratory Accreditation Program Procedures and General Requirements*.

_____ NIST Handbook 150-12, *National Voluntary Laboratory Accreditation Program GOSIP-Government Open Systems Interconnection Profile*.

_____ ISO/IEC DTR 13233, *Draft Technical Report - Interpretation of Accreditation Requirements in ISO/IEC Guide 25 - for Information Technology and Telecommunications Testing Laboratories for Software and Protocol Testing Services*.

_____ ISO 9000-1, *Quality Management and Quality Assurance Standards - Guidelines for Selection and Use*.

5.1.6 **Standards and Implementors Agreements/Profiles**

5.1.6.1 Implementors Agreements:

_____ Stable Implementation Agreements for Open Systems Interconnection Protocols, Version No. 1, December 1987, NIST Special Publication 500-150.

_____ Stable Implementation Agreements for Open Systems Interconnection Protocols, Version No. 3, December 1989, NIST Special Publication 500-177.

_____ Stable Implementation Agreements for Open Systems Interconnection Protocols, Version No. 7, December 1993, NIST Special Publication 500-214. (Available on CD ROM from IEEE or download by FTP to NEMO.NCSL.NIST.GOV, log-in as FTP, password is yourname@youraddress, look in FTP\PUB\OIW\AGREEMENTS.)

_____ Stable Agreement, Version No. (future)

5.1.6.2 Testing Related Standards:

_____ OSI Conformance Testing Methodology and Framework, Parts 1 - 7, ISO/IEC 9646.

5.1.6.3 Open Systems Interconnection Standards (ISO):

_____ 7-bit Coded Character Set for Information Processing Interchange, ISO/IEC 646, 1973.

_____ Information Processing - Open Systems Interconnection - Basic Reference Model, ISO/IEC 7498-1984(E).

_____ Information Processing - Data Communications - High Level Data Link Control Procedures - Description of the X.25 LAPB - Compatible DTE Data Link Procedures, ISO/IEC 7776.

_____ Information Processing - Open Systems Interconnection - Transport Service Definition, ISO/IEC 8072.

_____ Information Processing Systems - Transport Service Definition Covering Connectionless Mode Transmission, ISO/IEC 8072/ADD.

_____ Information Processing - Open Systems Interconnection - Transport Protocol Specification, ISO/IEC 8073.

_____ Information Processing Systems - Protocol for Providing the Connectionless Mode Transport Service, ISO/IEC 8602.

_____ Information Processing - Data Communications - X.25 Packet Level Protocol for Data Terminal Equipment, ISO/IEC 8208.

_____ Information Processing - Open Systems Interconnection - Session Service Definition, ISO/IEC 8326.

_____ Information Processing - Open Systems Interconnection - Session Protocol Specification, ISO/IEC 8327.

_____ Information Processing - Open Systems Interconnection - Network Service Definition, ISO/IEC 8348.

_____ Information Processing - Open Systems Interconnection - Addendum to the Network Service Definition Covering Connectionless Data Transmission, ISO/IEC 8348 AD1.

_____ Information Processing - Open Systems Interconnection - Addendum to the Network Service Definition Covering Network Layer Addressing, ISO/IEC 8348 AD2.

_____ Information Processing - Open Systems Interconnection - Protocol for Providing the Connectionless Network Service, ISO/IEC 8473.

_____ Information Processing - Open Systems Interconnection - File Transfer, Access and Management Part 1: General Introduction, ISO/IEC 8571-1.

_____ Information Processing - Open Systems Interconnection - File Transfer, Access and Management Part 2: The Virtual Filestore Definition, ISO/IEC 8571-2.

_____ Information Processing - Open Systems Interconnection - File Transfer, Access and Management Part 3: File Service Definition, ISO/IEC 8571-3.

_____ Information Processing - Open Systems Interconnection - File Transfer, Access and Management Part 4: File Protocol Specification, ISO/IEC 8571-4.

_____ Information Processing - Open Systems Interconnection - Internal Organization of the Network Layer, ISO/IEC 8648.

_____ Information Processing - Open Systems Interconnection - Service Definition for Association Control Service Elements- Part 2: Association Control, ISO/IEC 8649.

_____ Information Processing - Open Systems Interconnection - Protocol Specification for Association Control Service Element: Association Control, ISO/IEC 8650.

_____ Information Processing - Open Systems Interconnection - Service Definition for Association Control Service Elements- ADDENDUM 1: Peer Entity Authentication during Association Establishment, ISO/IEC 8649 DAD 1.

_____ Information Processing - Open Systems Interconnection - Protocol Specification for Association Control Service Element: ADDENDUM 1: Peer Entity Authentication during Association Establishment, ISO/IEC 8650 DAD 1.

_____ Information Processing - Local Area Networks - Part 2: Logical Link Control, ISO/IEC 8802/2.

_____ Information Processing - Local Area Networks - Part 3: Carrier Sense Multiple Access with Collision Detection, ISO/IEC 8802/3.

_____ Information Processing - Local Area Networks - Part 4: Token Passing Bus Access Method and Physical Layer Specifications, ISO/IEC 8802/4.

_____ Information Processing - Local Area Networks - Part 5: Token Ring Access Method and Physical Layer Specifications, ISO/IEC 8802/5.

_____ Information Processing - Open Systems Interconnection - Connection Oriented Presentation Service Definition, ISO/IEC 8822.

_____ Information Processing - Open Systems Interconnection - Connection Oriented Presentation Protocol Specification, ISO/IEC 8823.

_____ Information Processing - Open Systems Interconnection - Specification of Abstract Syntax Notation One (ASN.1), ISO/IEC 8824.

_____ Information Processing - Open Systems Interconnection - Specification of Basic Encoding Rules for ASN.1, ISO/IEC 8825.

_____ Information Processing - Data Communications - Use of X.25 to Provide the OSI Connection Mode Network Service, ISO/IEC 8878.

_____ Protocol Combination to Provide and Support the OSI Network Service - Provision and Support of the Connectionless Mode Network Service, ISO/IEC 8880-3.

_____ Information Processing Systems - Open Systems Interconnection - Virtual Terminal Services - Basic Class, ISO/IEC 9040.

_____ Information Processing Systems - Open Systems Interconnection - Virtual Terminal Services - Basic Class, ISO/IEC 9040, Addendum 1, 1988.

_____ Information Processing Systems - Open Systems Interconnection - Virtual Terminal Protocol - Basic Class, ISO/IEC 9041.

_____ Information Processing Systems - Open Systems Interconnection - Virtual Terminal Protocol - Basic Class, ISO/IEC 9041, Addendum 1, 1988.

_____ Information Processing Systems - Text Communication - Reliable Transfer, Part 1: Model and Service Definition, ISO/IEC 9066-1.

_____ Information Processing Systems - Text Communication - Reliable Transfer, Part 2: Protocol Specification, ISO/IEC 9066-2.

_____ Information Processing Systems - Text Communication - Remote Operations, Part 1: Model, Notation and Service Definition, ISO/IEC 9072-1.

_____ Information Processing Systems - Text Communication - Remote Operations, Part 2: Protocol Specification, ISO/IEC 9072-2.

_____ Database Language SQL, ISO/IEC 9075.

_____ Information Processing Systems - Fiber Distributed Data Interface (FDDI) Part 1: Token Ring Physical Layer Protocol, ISO/IEC 9314-1.

_____ Information Processing Systems - Fiber Distributed Data Interface (FDDI) Part 2: Token Ring Medium Access Control (MAC), ISO/IEC 9314-2.

_____ Information Processing Systems - Fiber Distributed Data Interface (FDDI) Part 3: Token Ring Physical Medium Dependent (PMD), ISO/IEC 9314-3.

_____ Information Processing Systems - Fiber Distributed Data Interface (FDDI) Part 4: Token Ring Single Mode Fiber Physical Medium Dependent (SMF-PMD), ISO/IEC 9314-4.

_____ Information Processing Systems - Fiber Distributed Data Interface (FDDI) Part 6: Token Ring Station Management (SMT) Medium Dependent (MAC), ISO/IEC 9314-6.

_____ Industrial Automation Systems - Manufacturing Messaging Specification Part 1: Service Definition, ISO/IEC 9506-1.

_____ Industrial Automation Systems - Manufacturing Messaging Specification Part 2: Protocol Specification, ISO/IEC 9506-2.

_____ Information Processing Systems - End Systems to Intermediate System Routing Exchange Protocol for use with ISO/IEC 8473, ISO/IEC 9542.

_____ Information Processing Systems - Open Systems Interconnection - Connectionless Session Protocol to Provide the Connectionless-Mode Session Service, ISO/IEC 9548.

_____ Information Processing Systems - Data Communications - Provision of the OSI Connection-mode Network Service, by Packet Mode Terminal Equipment Connected to an Integrated Services Digital Network (ISDN), ISO/IEC 9574.

_____ Information Processing Systems - Telecommunications and Information Exchange Between Systems - OSI Routing Framework, ISO/TR 9575.

_____ Information Processing Systems - Open Systems Interconnection - Connectionless Presentation Protocol to Provide the Connectionless-Mode Presentation Service, ISO/IEC 9576.

_____ Information Processing Systems - Open Systems Interconnection - Remote Database Access - Part 1: Generic Model, Service and Protocol, ISO/IEC 9579-1.

_____ Information Processing Systems - Open Systems Interconnection - Remote Database Access - Part 2: SQL Specialization, ISO/IEC 9579-2.

_____ Information Technology - Open Systems Interconnection - The Directory: Overview of Concepts, Models, and Service, ISO/IEC 9594-1.

_____ Information Technology - Open Systems Interconnection - The Directory: Models, ISO/IEC 9594-2.

_____ Information Technology - Open Systems Interconnection - The Directory: Abstract Service Definition, ISO/IEC 9594-3.

_____ Information Technology - Open Systems Interconnection - The Directory: Procedures for Distributed Operation, ISO/IEC 9594-4.

_____ Information Technology - Open Systems Interconnection - The Directory: Protocol Specifications, ISO/IEC 9594-5.

_____ Information Technology - Open Systems Interconnection - The Directory: Selected Attribute Types, ISO/IEC 9594-6.

_____ Information Technology - Open Systems Interconnection - The Directory: Selected Object Classes, ISO/IEC 9594-7.

_____ Information Technology - Open Systems Interconnection - The Directory: Authentication Framework, ISO/IEC 9594-8.

_____ Information Technology - Open Systems Interconnection - The Directory: Replication, ISO/IEC 9594-9.

_____ Information Technology - Open Systems Interconnection - Management Information Service Definition - Common Management Information Service Definition, ISO/IEC 9595.

_____ Information Technology - Open Systems Interconnection - Management Information Service Definition - Common Management Information Protocol, ISO/IEC 9596-1.

_____ Information Processing Systems - Open Systems Interconnection - Service Definition of Common Application Service Elements - Commitment, Concurrency and Recovery, ISO/IEC 9804.

_____ Information Processing Systems - Open Systems Interconnection - Specification of Protocols for Common Application Service Elements - Commitment, Concurrency and Recovery, ISO/IEC 9805.

_____ Information Processing Systems - Open Systems Interconnection - Distributed Transaction Processing - Part 1: Model, ISO/IEC 10026-1.

_____ Information Processing Systems - Open Systems Interconnection - Distributed Transaction Processing - Part 2: Service, ISO/IEC 10026-2.

_____ Information Processing Systems - Open Systems Interconnection - Distributed Transaction Processing - Part 3: Protocol, ISO/IEC 10026-3.

_____ Information Technology - Telecommunications and Information Exchange Between Systems - End System Routing Information Exchange Protocol for use in conjunction with ISO/IEC 8878, ISO/IEC 10030.

_____ Information Processing Systems - Open Systems Interconnection - Connectionless ACSE Protocol to Provide the Connectionless-Mode ACSE Service, ISO/IEC 10035.

_____ Information Processing Systems - Telecommunications and Information Exchange between Systems - MAC Sublayer Interconnection (MAC Bridging), ISO/IEC 10038.

_____ Information and Documentation - Search and Retrieve Application Service Definition for OSI, ISO/IEC 10162.

_____ Information and Documentation - Search and Retrieve Application Protocol Specification for OSI, ISO/IEC 10163.

_____ Information Technology - Open Systems Interconnection - Systems Management - Part 1: Object Management Function, ISO/IEC 10164-1.

_____ Information Technology - Open Systems Interconnection - Systems Management - Part 2: State Management Function, ISO/IEC 10164-2.

_____ Information Technology - Open Systems Interconnection - Systems Management - Part 3: Attributes for Representing Relationships, ISO/IEC 10164-3.

_____ Information Technology - Open Systems Interconnection - Systems Management - Part 4: Alarm Reporting Function, ISO/IEC 10164-4.

_____ Information Technology - Open Systems Interconnection - Systems Management - Part 5: Event Report Management Function, ISO/IEC 10164-5.

_____ Information Technology - Open Systems Interconnection - Systems Management - Part 6: Log Control Function, ISO/IEC 10164-6.

_____ Information Technology - Open Systems Interconnection - Systems Management - Part 7: Security Alarm Reporting Function, ISO/IEC 10164-7.

_____ Information Technology - Open Systems Interconnection - Structure of Management Information - Part 2: Definitions of Management Information, ISO/IEC 10165-2.

_____ Information Technology - Open Systems Interconnection - Structure of Management Information - Part 4: Guidelines for the Definition of Managed Objects, ISO/IEC 10165-4.

_____ Information Processing Systems - Telecommunications and Information Exchange Between Systems - Intermediate System to Intermediate System Intra-Domain Routing Exchange Protocol for Use in Conjunction with the Protocol for Providing the Connectionless Mode Network Service (ISO/IEC 8473), ISO/IEC 10589: 1992 (E).

_____ Information Technology - Telecommunications and Information Exchange Between Systems - Elements of Management Information Related to OSI Network Layer Standards, Revised text for ISO DIS 10733, Sept 26, 1991.

_____ Information Technology - Telecommunications and Information Exchange Between Systems - Elements of Management Information Related to OSI Transport Layer Standards, ISO DIS 10737-1.

_____ Information Processing Systems - Telecommunications and Information Exchange Between Systems - Protocol for Exchange of Inter-Domain Routing Information among Intermediate Systems to Support Forwarding of ISO/IEC 8473 PDUs, CD 10747.

_____ Information Processing Systems - Open Systems Interconnection International Standardized Profile 12061 - Transaction Processing.

5.1.6.4 Open Systems Interconnection Standards (ITU-T):

_____ ITU-T Recommendation X.25 1984, Interface Between Data Terminal Equipment (DTE) and Data Circuit-Terminating Equipment (DCE) for Terminals Operating in the Packet Mode on Public Data Networks.

_____ ITU-T Recommendation X.400, (Red Book 1984), Message Handling Systems: Systems Model-Service Elements.

_____ ITU-T Recommendation X.401, (Red Book 1984), Message Handling Systems: Basic Service Elements and Optional User Facilities.

_____ ITU-T Recommendation X.408, (Red Book 1984), Message Handling Systems: Encoded Information Type Conversion Rules.

_____ ITU-T Recommendation X.409, (Red Book 1984), Message Handling Systems: Presentation Transfer Syntax and Notation.

_____ ITU-T Recommendation X.410, (Red Book 1984), Message Handling Systems: Remote Operations and Reliable Transfer Server.

_____ ITU-T Recommendation X.411, (Red Book 1984), Message Handling Systems: Message Transfer Layer.

_____ ITU-T Recommendation X.420, (Red Book 1984), Message Handling Systems: Interpersonal Messaging User Agent Layer.

_____ ITU-T Recommendation X.121, (Red Book 1985), International Numbering Plan for Public Data Networks.

_____ ITU-T Recommendation V.35, Data Transmission at 48 kilobits/second using 60-108 kHz group band circuits.

_____ Electronic Industries Association, EIA-232C, Interface Between Data Terminal Equipment and Data Communication Equipment Employing Serial Binary Data Interchange.

5.1.6.5 ATS and MOT Related Documents:

_____ Relevant MOT Users Manuals, Installation Manuals, and Executable Test Suites.

_____ Check Abstract Test Suite Version against latest register:

___ FTAM

___ X.400 (84)

___ X.500

___ Network Management (CMIP)

___ X.400 (88)

___ MMS

___ Session

___ Transport Class 4

___ Transport Class 2

___ Transport Class 0

___ CLNP

___ ES-IS

___ IS-IS

___ X.25

___ ISDN

___ 802.3

_____ Check PICS-Proforma Version against latest register:

___ FTAM

___ X.400 (84)

___ X.500

___ Network Management (CMIP)

___ X.400 (88)

___ MMS

___ Session

___ Transport Class 4

___ Transport Class 2

___ Transport Class 0

___ CLNP

___ ES-IS

___ IS-IS

___ X.25

___ ISDN

___ 802.3

5.2 EQUIPMENT

_____ 5.2.1 Using the equipment inventory list referenced in the Quality Manual, determine the location and status of each piece of equipment.

_____ 5.2.2 Is the equipment listed available to the test laboratory staff? Are any items of equipment restricted in use?

_____ 5.2.3 Select one piece of equipment and request a complete history of what has been done with this system. Verify that the explanation is compliant with the maintenance procedures.

5.3 RECORDS

_____ 5.3.1 Examine the location and status of personnel records, including those related to job qualifications and staff training. Explore evidence of training on lab operations, test methods, protocols, systems, and test systems.

_____ 5.3.2 Examine the location and status of equipment records, including hardware, software, operating systems and maintenance records.

_____ 5.3.3 Examine the location and status of Abstract Test Suite updates and maintenance activity.

_____ 5.3.4 Examine the location and status of Means of Testing acquisition and maintenance documentation, including MOT Releases, Executable Test Suites, Defect Reporting and disposition information.

_____ 5.3.5 Examine the location and status of test campaign records, including Static and Dynamic aspects, paying attention to PICS, PIXIT, PCTR, SCTR, and test engineer logging information which may be used to reproduce a test campaign.

_____ 5.3.6 Is there adequate physical security of the record-keeping facility to prevent unauthorized access to the records?

5.4 SITE AND CLIENT SECURITY

_____ What are the physical measures taken to ensure client security and confidentiality?

5.5 TESTING ENVIRONMENT

_____ Are there any special facilities requirements for the method of test?

6 CONFORMANCE TESTING CAPABILITIES CHECKLIST

6.1 TEST ENGINEER (OR EQUIVALENT FUNCTION) COMPETENCE

_____ 6.1.1 The assessor should review with the Test Engineer the purpose of the interview.

_____ 6.1.2 The assessor should review the Test Engineer's personnel file and résumé prior to the interview.

_____ 6.1.3 Test Engineer's name:

_____ 6.1.4 Job title:

_____ 6.1.5 Ask the Test Engineer to describe his/her duties in the test laboratory. What is he/she responsible for in the testing process?

_____ 6.1.6 Is the description given by the Test Engineer consistent with what is in the personnel file and résumé?

_____ 6.1.7 What protocols will the Test Engineer be testing and what Means of Testing will be used? List these in the space below.

_____ 6.1.8 Who is responsible for the following elements?

Test preparation

Static conformance review

Test case selection

Test execution

Test analysis

Report production

_____ 6.1.9 Does the Test Engineer understand the test laboratory structure?

_____ 6.1.10 Is the Test Engineer aware of the extent of his/her responsibility? The assessor might ask if there is anything specific the Test Engineer is not allowed to do.

_____ 6.1.11 Does the Test Engineer have other duties or responsibilities which are not a part of the test laboratory? Record the key points below.

_____ 6.1.12 Do these additional responsibilities conflict with test laboratory responsibilities? If so, how?

_____ 6.1.13 Ask the Test Engineer, "What do you understand by quality in testing and how do you ensure Repeatability and Reproducibility over successive test campaigns?" Is there a checklist for this purpose?

_____ 6.1.14 Is the engineer familiar with the quality and procedures manuals?

_____ 6.1.15 Ask the Test Engineer how the quality and procedures manuals affect her/him.

_____ 6.1.16 Is the Test Engineer familiar with the ISO/IEC 9646-5 process of conformance assessment, and does he/she understand his or her role in that process? Ask the Test Engineer to describe the process.

_____ 6.1.17 Ask the engineer how long he or she has been using the relevant test system. The assessor should try to assess capability in terms of protocol knowledge demonstrated, adherence to procedures, and general use of the test tool.

_____ 6.1.18 Has the Test Engineer received training in the test system's hardware and operating system environment? If not, and the Test Engineer does not demonstrate sufficient capability using the test system, then training should be recommended.

_____ 6.1.19 Has the Test Engineer received more general training in laboratory operations, OSI, and Testing Methodology?

_____ 6.1.20 Is there a person in the laboratory specifically designated as the Test Engineer's "Mentor"; i.e., who can be approached with general and specific questions about testing and OSI?

Are there laboratory staff members who can approach the Test Engineer with general and specific questions about testing and OSI?

_____ 6.1.21 Does the Test Engineer know where the quality manual, test systems documentation, and hardware and operating systems documentation are kept, and have ready access to and adequate familiarity with the documents?

6.2 MEANS OF TESTING (MOT) CAPABILITIES

_____ 6.2.1 Record below the MOTs being assessed.

_____ 6.2.2 Are the MOTs in use registered with CSL?

_____ 6.2.3 Does the test laboratory have communications connectivity compatible with GOSIP? Check and circle as appropriate.

____ X.25 (1980, 1984, 1988)

____ LAN (8802.3, 8802.4, 8802.5)

____ ISDN

____ Other (Describe)

6.2.4 **Test Preparation**

_____ 6.2.4.1 Ask the above-named staff for an overview of the test preparation procedures as carried out by the test laboratory. Is the explanation consistent with the procedures and quality manual?

_____ 6.2.4.2 What are the client's responsibilities during the test preparation phase and how is the client made aware of these responsibilities? Is the explanation consistent with the procedures and quality manual?

_____ 6.2.4.3 Ask for an explanation of the process carried out if the PICS and PIXITs are not completed when submitted or are not submitted on time. Is the explanation consistent with the procedures and quality manual?

6.2.5 Static Conformance Review

_____ 6.2.5.1 Ask the engineer to explain what he/she looks for while examining the PICS. The PICS is examined to ensure that it is completely filled out (including vendor and IUT information, and the tables) and that the IUT has implemented the mandatory requirements for conformance.

_____ 6.2.5.2 Ask the engineer to show how to determine static conformance. Ask what he or she looks at in the PICS to determine static conformance. Does the explanation demonstrate competence to determine static conformance?

_____ 6.2.5.3 What does the engineer do if the PICS are incomplete? Is this consistent with the quality manual?

6.2.6 Test Case Selection

_____ 6.2.6.1 Ask the engineer to explain how test cases are selected. Is the explanation consistent with the quality and procedures manuals?

_____ 6.2.6.2 The assessor should have prepared a selection of test cases which will be executed. Ask the Test Engineer to justify the selection. The selection should also include tests which should not be run. Write below the test cases selected and the assessor justification for selection. Is the engineer's justification consistent?

_____ 6.2.6.3 If test case selection is automatic, there should be some verification/justification of the tests not selected by the tool.

6.2.7 **Test Parameterization**

_____ 6.2.7.1 How would the engineer go about changing initialization or parameterization information if it were incorrectly entered? Is this correct for the given test system?

_____ 6.2.7.2 How is one IUT's environment kept separate from another's? Is this consistent with the quality and procedures manuals?

6.2.8 **Test Execution**

_____ 6.2.8.1 Ask the engineer to execute the selected tests. Is his/her use of the MOT correct? Does he/she demonstrate a good working knowledge of the MOT?

_____ 6.2.8.2 Ask what level of analysis the engineer performs during test execution and what tools does he/she use to do so? Is this correct for the MOT?

_____ 6.2.8.3 Ask how the Test Engineer records/tracks the location of test data and observations? Is this consistent with the quality and procedures manuals and is the procedure adequate for maintaining accurate records?

_____ 6.2.8.4 Does the Test Engineer know the policy for retest?

_____ 6.2.8.5 Does the engineer know the procedures for negotiated exits? Is this consistent with the quality and procedures manuals?

_____ 6.2.8.6 Does the engineer know the procedure for changes to the test environment? Is this consistent with the quality and procedures manuals?

_____ 6.2.8.7 Ask what the engineer does in the event of an abnormal execution of a test case? Is this consistent with the quality and procedures manuals?

_____ 6.2.8.8 Does the engineer know what records, data, etc. are to be turned over for record-keeping purposes? Also ask how the records are turned over. Is this consistent with the quality and procedures manuals?

6.3 TEST ANALYST COMPETENCE

_____ 6.3.1 Ask what tools the analyst uses to analyze test cases? Are these the appropriate tools?

_____ 6.3.2 Ask the analyst to analyze the tests which were run. Does the analyst demonstrate a good working knowledge of the analysis tools?

_____ 6.3.3 Is the test analyst able to properly determine/validate a verdict assignment?

_____ 6.3.4 Is the analyst familiar with the forms for recording verdicts?

_____ 6.3.5 Does the analyst know the policy and procedures (according to the quality and procedures manuals) for handling inconclusive or failed verdicts?

6.4 REPORT GENERATION

_____ 6.4.1 Discuss how a test report is prepared.

Does the Test Engineer demonstrate an understanding of laboratory forms and other means of documentation?

Is the staff able to easily locate the information to be recorded?

In general, the test laboratory's testing procedures should be such that all the necessary information is recorded and tracked throughout the process.

_____ 6.4.2 Ask what happens to the test report after it is completed. What are the procedures for the Approved Signatory to ensure the validity of the test reports? If so, are those procedures followed?

6.5 LOGGING INFORMATION

_____ 6.5.1 Ask the Test Engineer to list all the information which must be recorded during a test campaign. Is it compliant with the quality manual?

_____ 6.5.2 Assuming the laboratory has some history of testing, request all the information recorded during a past test campaign. Verify the completeness of the information and its compliance with the quality manual.

6.6 RECORDKEEPING

_____ 6.6.1 Ask where the records come from and how the recordkeeper goes about getting them.

_____ 6.6.2 Does the recordkeeper demonstrate working knowledge of the record-keeping process?

NVLAP LAB CODE:

GOSIP SPECIFIC OPERATIONS CHECKLIST - COMMENTS AND DEFICIENCIES

Instructions to the Assessor: Use this sheet to document comments and deficiencies. For each, identify the appropriate item number from the checklist. Identify comments with a "C" and deficiencies with an "X." If additional space is needed, make copies of this page (or use additional blank sheets).

Item No.	*Comments and/or Deficiencies*

GOSIP SPECIFIC OPERATIONS CHECKLIST - COMMENTS AND DEFICIENCIES

Instructions to the Assessor: Use this sheet to document comments and deficiencies. For each, identify the appropriate item number from the checklist. Identify comments with a "C" and deficiencies with an "X." If additional space is needed, make copies of this page (or use additional blank sheets).

Item No.	*Comments and/or Deficiencies*

APPENDIX D

NIST COMPUTER SYSTEMS LABORATORY

NATIONAL INSTITUTE OF STANDARDS AND TECHNOLOGY
COMPUTER SYSTEMS LABORATORY

The National Institute of Standards and Technology (NIST), Computer Systems Laboratory (CSL) is responsible for developing U.S. government-wide standards for data communications networks and related telecommunication systems. The authority for this responsibility is assigned under the Federal Property and Administrative Services Act of 1949, as amended by Public Law 100-235.

CSL develops standards, provides technical assistance, and carries out research to advance the effective use of computers by government and industry. CSL works through voluntary industry standards organizations to develop standards that will meet the needs of government users. These standards are issued as Federal Information Processing Standards (FIPS) and provide the foundation for compatibility and, where necessary, interoperability between government systems implementing these standards. FIPS also serve as the basis for government acquisition of commercial off-the-shelf products and services from competitive sources.

The pace of standards development for data communications networks and telecommunications has intensified in recent years, stimulated by user needs for interconnectivity of hardware, software, and network systems. These standards are increasingly complex—often describing functional requirements and allowing for numerous options in implementation.

To achieve interoperability and effective use of information systems, users need off-the-shelf products that work together and conform to these emerging standards. Where products are expected to support complex standards specifications, conformance testing may be required to reduce risks and raise consumer confidence in information system products.

CSL is responsible for organizing, managing, directing and administering the FIPS program. Among the responsibilities assigned under the FIPS program is the task of ensuring that, for products to be acquired by the federal government, a mechanism is available for determining that these products conform to the FIPS. In carrying out this task, the CSL develops and maintains conformance testing programs for the FIPS. These programs require adequate test methods and procedures, suitable candidate test laboratories for accreditation, and a formal acknowledgment of product testing for compliance or noncompliance to a FIPS.

Overview of Conformance Testing Methodology

Within the International Organization for Standardization (ISO) conformance testing methodology has developed and is the subject of a separate standard (ISO/IEC 9646 *OSI Conformance Testing Methodology and Framework*) [ISO 1]. Its purpose is to define standardized methods which may be used for conformance testing and to define relationships between: 1) parties supplying the means of testing OSI protocols and test laboratories, and 2) test laboratories and their clients, and the information exchanged between them. Conformance testing concentrates on determining whether an implementation of a protocol conforms to both static and dynamic requirements specified in a protocol standard.

Current conformance test technology provides for tools which separate the testing concerns of any 7-layer OSI stack into three functional groups:

- Upper Layers: Session - Application
- Intermediate Layers: Network - Transport
- Lower Layers: Physical - Link

Higher layer protocols are tested, and operated, over a stack of supporting protocols. ISO/IEC 9646 prescribes testing of the lower layer protocols prior to testing the protocols which they support. One reason for this arrangement is that direct access to a layer service affords the greatest possible capability of controlling and observing events within that layer. Another reason is that the development of the means of testing followed the development of protocol stack implementations, and the means of testing for lower layer protocols were available earliest. An advantage afforded by this approach is that the Protocol Conformance Test Report (PCTR) can be used in support of incremental testing, specifically so that full regression testing is not needed in testing a larger stack which builds on the already tested functionality.

Full-stack testing is also an alternative, although no 7-layer means of testing is currently in existence. Full-stack methods require that each protocol in the stack be tested by embedded methods (except the Application protocols which are tested by single-layer methods). This procedure is repeated for every new Application stack, since each new service user may exercise paths within a lower layer protocol which are not explored by a different service user in another full stack.

APPENDIX E

TEST METHOD SELECTION LIST

NVLAP LAB CODE: _____

COMPUTER APPLICATIONS TESTING
TEST METHOD SELECTION LIST - GOSIP CONFORMANCE TESTING

Instructions: Check each Test Method Code for which you are requesting accreditation. Check options where applicable.

GOSIP CONFORMANCE TESTING USING TEST METHODS IN ISO/IEC 9646 OSI CONFORMANCE TESTING METHODOLOGY AND FRAMEWORK

Note: The laboratory must be prepared to supply target Systems Under Test for each test method selected. In some circumstances the assessor may request the laboratory to connect remotely to a designated site.

	NVLAP Test Method Code		*Test Method Designation & Options*	*Communications Platform*
_____	17/G01		ISO/IEC 8571/8650/8823: FTAM/ACSE/Presentation (Session)	_____
_____	17/G03		ITU X.400-1984 MHS: P2/P1/RTS/(Session)	_____
_____	17/G05		ISO/IEC 8327: Session	_____
_____	17/G07		ISO/IEC 8073: Transport Class 4	_____
_____	17/G09		ISO/IEC 8073: Transport Class 2/ Transport Class 0	_____
_____	17/G11			
		_____	ISO/IEC 8473: Connectionless Network Protocol (CLNP)	_____
		_____	ISO/IEC 9542: End System-Intermediate System (ES-IS)	_____
_____	17/G13		ISO/IEC 8802.2/8802.3	_____
_____	17/G19		ITU X.25: PLP/HDLC LAP B	_____
_____	17/G21		ITU X.400-1988 MHS	_____
		_____	ITU X.400-1988 MHS: P2/P1/RTSE/ ACSE/Presentation (Session)	
		_____	ITU X.400-1988 MHS: P3	
		_____	ITU X.400-1988 MHS: P3/ROSE	
		_____	ITU X.400-1988 MHS: P7	
		_____	ITU X.400-1988 MHS: P7/ROSE	
_____	17/G23		ITU-T X.500-1988 DS:Directory Services - Directory Access Protocol	_____

Enter the total number of Test Method Codes selected on Line 5b of the Program Fee Calculation Form for the GOSIP Program. Complete the Application Supplement on back of this page.

NVLAP LAB CODE: _____

COMPUTER APPLICATIONS TESTING
APPLICATION SUPPLEMENT - GOSIP CONFORMANCE TESTING

QUALITY ASSURANCE MANUAL:

Before your initial on-site and for renewals requiring an on-site assessment, please provide NVLAP with a copy of your laboratory quality manual and test procedures, including specifics for GOSIP Conformance testing. The manual and procedures may accompany this application or may be sent at a later date. The NVLAP on-site assessor(s) will review the Manual *before conducting* the on-site assessment of your laboratory and return it afterwards.

TEST ITEM IDENTIFICATION:

Fill in the test method code from the Test Method Selection List; e.g., 17/G01, 17/G03, etc. Use a separate copy of this form for each test method for which accreditation is requested.

Provide the name of the manufacturer and model of *each item* which the assessor may closely examine during the on-site visit. Note: The same physical item may be used for multiple test methods.

NVLAP Code	*Item*	*Manufacturer and Model*	*No. of Similar Items*
_____	GOSIP Registered Mean of Test (MOT)	_____	_____
	Computer Processor	_____	_____
	Printers, Terminals, Disk and Tape Store	_____	_____
		_____	_____
	Wide Area Network Connectivity	_____	_____
		_____	_____
	Local Area Network Connectivity	_____	_____
		_____	_____

Describe any of the above items which are special, modified, or custom designed.

_____

_____

_____

_____

APPENDIX F

LIST OF ACRONYMS

LIST OF ACRONYMS

AARE	Associate Response Service Primitive
AARQ	Associate Request Service Primitive
ACSE	Association Control Service Elements
APDU	ACSE Protocol Data Unit
ASN.1	Abstract Syntax Notation One
CLNP	Connectionless Network Protocol
CLNS	Connectionless Network Service
CONS	Connection Oriented Network Service
CP	Presentation Connect PPDU
CPA	Presentation Accept PPDU
CPR	Presentation Reject PPDU
CR	Connect Request TPDU
CSL	Computer Systems Laboratory, NIST
ES	End System
FIPS	Federal Information Processing Standard
FPDU	File Protocol Data Unit
FTAM	File Transfer Access and Management
GOSIP	Government Open Systems Interconnection Profile
HDLC	High-level Data Link Control
IPMS	Interpersonal Messaging Service
IS	Intermediate System (or International Standard)
LAPB	Link Access Protocol B
LLC	Logical Link Control
MOT	Means of Testing
MTA	Message Transfer Agent
OSI	Open Systems Interconnection
P1	P1 Protocol for Message Transfer Agents
P2	P2 Protocol for Interpersonal Messaging Services
PCO	Point of Control and Observation
PCTR	Protocol Conformance Test Report
PPDU	Presentation Protocol Data Unit
QOS	Quality of Service
RTS	Reliable Transfer Service
SCTR	System Conformance Test Report
SUT	System Under Test
TP0	Transport Protocol Class 0
TP2	Transport Protocol Class 2
TP4	Transport Protocol Class 4
TPDU	Transport Protocol Data Unit
TTP	Transport Test Platform

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NIST Technical Publications

Periodical

Journal of Research of the National Institute of Standards and Technology—Reports NIST research and development in those disciplines of the physical and engineering sciences in which the Institute is active. These include physics, chemistry, engineering, mathematics, and computer sciences. Papers cover a broad range of subjects, with major emphasis on measurement methodology and the basic technology underlying standardization. Also included from time to time are survey articles on topics closely related to the Institute's technical and scientific programs. Issued six times a year.

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Order the **following** *NIST publications—FIPS and NISTIRs—from the National Technical Information Service, Springfield, VA 22161.*

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NIST Interagency Reports (NISTIR)—A special series of interim or final reports on work performed by NIST for outside sponsors (both government and nongovernment). In general, initial distribution is handled by the sponsor; public distribution is by the National Technical Information Service, Springfield, VA 22161, in paper copy or microfiche form.

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